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BONES AS MANURE.

Bones, although of comparatively late introduction as manure, have yet occupied so much of farming attention within these few years, that we have no hesitation in placing them at the head of those miscellaneous substances which are usually employed for that purpose. They have indeed been used in some parts of England for a long time, and have been extensively imported from the Continent into the town of Hull, where several machines have been erected either for grinding them into powder, or bruising them into small pieces; which modes of application have been found so advantageous, that they have, within the last twenty years, excited general attention, and are now in almost universal use as the principal manure for raising turnip crops on the calcareous soils in Yorkshire and Lincolnshire. It is upon this description of land that they are the most decidedly valuable, and the testimony of some farmers of experience, proves that to mix them with a portion of vegetable or coal ashes, is a profitable application for the production of turnips; as, by this method, the vegetation of the seed is quickened, and the young plant, getting rapidly into rough leaf, thus escapes the fly.

Long before the great advantage which may be derived from ground or well-crushed bones was generally known, many persons were aware of their fertilizing properties. To render them available, however, the wasteful and injurious process of reducing them into ashes by fire was then commonly resorted to; by which, indeed, a certain degree of benefit was imparted to land upon which sulphate of lime or gypsum will have effect, but could not be so effectual, in point of nourishment, as bone in an uncalcined state, because the oil and other nutritive matter which it contains is thus dissipated. In other instances, they were either reduced by lime, or laid at the bottom of the farmyard, and decomposed by the effect of urine, and in some cases were partially broken by the hammer. In these modes, however, great quantities were wasted, which is now prevented by the improved method of preparing them by machinery: it is therefore useless to enter further into the details of practice which has become obsolete.

When reduced to powder, the bones alone are ground, being divested by the process of boiling, not only of every particle of flesh, but also of a material portion of oil which is also extracted; and it is only in that state that they can be brought to the condition of fine powder. In this state, it is only reasonable to suppose that they cannot be so beneficial to the land as when fresh and unboiled; yet we find, by the report of the Doncaster Association "on bone manure,"—to which we shall presently refer—that they have been found more effectual after having passed through the manufactories. When not ground completely into powder, they are, however, broken in the machines, by cast-iron rollers, formed with deeply indented rims, by which they are first partially bruised, and then falling down upon other sets of rollers, each with the teeth more closely fixed, they are in this manner reduced to various sizes, from one inch to half an inch in thickness, and a considerable quantity of coarse dust is also procured by the process. These bones are usually sold under the respective designations of inch, three-quarters inch, half-inch, or dust; but the greatest demand is for those of the half-inch size, which contain all the dust which has been formed in crushing them. The "dust" is collected in great measure by ridding the inch and three-quarters inch bones.

When the bones are not boiled, each pair of rollers is furnished with a set of malleable iron scrapers attached below, in order to clear the teeth of any animal matter which may adhere to them, and thus the oily substance contained in the bones is saved*. As bone-mills have been now very generally erected, there are few parts of the country where the manure cannot be procured in a prepared state; but when the bones are only to be had raw, and it is an object with the farmer to reduce them to a small size, they can be easily broken to pieces by his own laborers. Several farmers have indeed erected small machines with two cylinders of cast-iron, with teeth, which lock into each other, by which they are broken into small pieces. The price at the mills varies, of course, according to the trouble of preparation, the distance of carriage, for grinding, and the demand; but commonly averages, for the dust, from 2*s*. 6*d*. to 3*s*., and in some late instances even 3*s*. 6*d*. have beed paid—for pieces, from 2*s*. to 2*s*. 3*d*., according to size—and 1*s*. 10*d*. for rough bones, per imperial bushel. No allowance appears to be generally made by the dealers on those which have gone through the process of boiling.

The expense of bones purchased in the rough state, and broken on the farm, is thus stated as an actual charge incurred per acre—

	£		
24 cwt. bones, prime cost - -	£2	3	2
Carriage of ditto, 7 miles - -	0	7	0
6½ days, man breaking bones, at 1*s*. 10*d*. - - - - - - - - -	0	11	11
3½ do. a girl spreading do. on the drills - - - - - - - - - -	0	2	11
	£3	5	0

Experiments.

Their effects will be best seen by the following trials:

On the estate of Garrowby, on the Yorkshire Wolds, belonging to Sir Francis Wood, the crops of turnips had dwindled to nothing, and the fallows, though tolerably manured, were covered only with common hemp, nettle, and other weeds, instead of turnip plants; but by the use of twelve

* See the Prize Essays of the Highland Society, for a detailed description, accompanied with plates of a very complete mill for crushing bones, erected by Mr. Anderson of Dundee.—N. S., vol. i. p. 301. Ibid. p. 73.

to twenty bushels of bone-dust in drills, the turnip crops have become excellent, and the following crops are very considerably improved*.

At Clumber Park, the seat of the Duke of Newcastle, in Nottinghamshire, 600 bushels of small bones were, in 1822, spread upon 24 acres of grass land, in the dairy farm, consisting of dry, sandy, and gravelly soil, which had been laid down about ten years. Their effect upon the pasture improved the condition of the cows so materially, that about twice the quantity of butter was made from them than from cows grazed upon land of similar quality, but not boned; and this effect, it is said still continues†.

Twenty-five bushels of bruised bones, per Scotch acre, having been applied by Mr. Watson, of Keillor, near Cupar Angus, to Aberdeen yellow turnips, on some sharp black land, brought them above ground on the third day, and into rough leaf on the tenth; on the fifteenth, they were fit to be thinned out; while farm-yard manure, though applied to the same soil, at the rate of twenty-five cart-loads per acre, did not bring them up till the fifth day, nor render them fit for the hoe until the twentieth. They in this manner manifested the same superiority until the month of September, when the weather having set in dry, it was expected that the crop would cease growing; which was the case with that part which had been dunged, but the bone turnips continued to grow vigorously, and upon a comparative trial in the middle of October, their produce exceeded those which were dunged, by six tons per acre: twenty-eight tons to twenty-two‡.

On some land, the quality of which is not stated, crushed bones were laid by Mr. Falla, of Gateshead, near Newcastle-upon-Tyne, at the rate of 100 bushels per acre; the rest of the field being manured with well-rotted stable-dung, at the rate of fifteen two-horse cart-loads per acre; that part which was boned was superior to some parts of the dunged ground, and fully equal to the rest§.

Mr. Graburn, of Barton, in Lincolnshire, has manured with crushed bones, at the rate of thirty bushels, and with dung at eight loads per acre, for turnips, after which the turnips were much later than the rest. On the second year of seeds, after the turnips, he covered the dunged part with yard manure a second time, and two years afterwards, a third time; then sowed the land with wheat, and the boned ground produced rather a better crop than that which had been thus thrice dunged‖.

During the dry summer of 1826, thirty-four acres of a siliceous sandy soil, on the estate of Sir Charles Throckmorton, at Buckland, in Oxfordshire, half of which had been manured with farm-yard manure, and the remainder with bones. The whole was sown with turnips, drilled in the Northumberland fashion; and that portion on which the bones were laid presented a remarkably fine crop, nearly a fourth part advanced in bulb about the latter end of August, while that part which had been dunged was merely getting into leaf. The experiment was repeated in 1827, on green-globe turnip, sown on the 20th of July, upon similar land, with the same superiority in favor of the bones: the succeeding crop of barley also produced five bushels per acre more than that which followed the dunged turnips, and the cover was also heavier*.

The Honorable Captain Ogilvie, of Airlie Castle, has also applied bone dust, at the rate of 15 and 20 bushels per acre, to a light sandy loam, with a subsoil of gravel and sand, coming in some places nearly to the surface; and after the experience of five years upon a series of trials commenced in 1827, he found all the successive crops of turnips, barley, and grass-seeds so decidedly superior to those which had been previously produced by other manure, that the Highland Society last year awarded their honorary silver medal to his Report.

To these facts in favor of bone manure, others must, however, be also stated of an opposite tendency, particularly when placed in opposition to farm-yard manure, to which we wish to call especial attention in comparison with bones, as being at the command of every farmer.

On the estate of Mr. Evans, jun., of Dean House, also in the county of Oxford, bones were tried for the wheat crop upon calcareous stony land, in comparison with stable-yard manure; but the dung had so greatly the advantage, that the bone crop appeared but little if any degree better than that on soil without any manure whatever.†

On the lands of Mr. Hawden, in Kincardineshire, turnips were sown in the month of June, on various soils, in drills laid off at 27 inches apart: the manure was laid on in single Scotch acres; and the produce of the roots, exclusive of tops, accurately weighed, as follows:—

On a mixture of stiff clay and gravel,		
12 tons of farm-yard manure	produced	26 tons 8 cwt.
1½ „ bone-dust	„	23 „ 12 „
On a soft sandy soil, naturally inclined to moor,		
16 tons of farm-yard manure	produced	29 tons 12 cwt.
1¼ „ bone-dust	„	24 „ 16 „
On a sandy light soil, sown the following year,		
16 tons of farm-yard manure	produced	25 tons 16 cwt.
1 „ bone-dust	„	23 „ 18 „
10 cwt. horn-shavings, mixed with 1 cart-load of hen-dung and 9 ditto coal-ashes	„	20 „ 6 „

It is also remarkable, that although three of the drills were spread unmixed with the horn-shavings, which are considered as a more powerful manure than bone, yet they only produced at the rate of 2 tons 13 cwt. per acre.‡

On Mr. Boswell's farm of Kingcaussie, in Kincardineshire, two acres of Norfolk globe turnips were drilled upon poor high ground, reclaimed from moor, and

20 cart-loads, or tons, of dung	produced	32 tons 14 cwt.
1¼ ton of bones	„	28 „ 13 „

On the same farm, in another year, the season of 1824 being cold and wet operated very much against the turnips which were manured with

*Doncaster Report, p. 6.

† Ibid. p. 13.

‡ Quart. Journ. of Agric. N. S., vol. i. p. 14.

§ Farmer's Magazine, vol. xvi. p. 330.

‖ Lincoln. Report, p. 300.

* Prize Essays of the Highland Society, N. S., vol. i. p. 75, communicated by Mr. G. Sinclair.

† Ibid. p. 77, communicated by Mr. G. Sinclair.

‡ Prize Essays of the Highland Society, N. S., vol. i. p. 69.

bones; but in that of 1822, those raised with bones and stable-dung appeared to be equal.*

Notwithstanding this evident difference against the produce obtained by bones, in point of weight it should not, however, escape remark, that the latter gentleman estimates the value of their return in money as being superior; for the cost of the two manures is, according to his calculation, as follows:—

One acre manured with farm-yard dung—			
20 cart-loads of dung, including carriage, at 10s. per load		£10	0
33 tons of turnips, at 10s. per ton		16	10
Net return		£6	10
One acre manured with bone—			
1¼ ton of bones, at 42s.	£2 12 6		
Breaking and driving ditto	0 18 0		
	3	10	6
29 tons of turnips, at 10s. per ton	14	10	0
Net return	£10	19	6

Thus leaving a difference in favor of bones of no less than £4 9s. 6d.—or what we should in this country call a tolerably fair value, if fed off, for the produce of an imperial acre: but although the price of the turnips is far beyond present rates, and the charge of dung, unless carried to a great distance, is too high, we yet leave the account as it stands, as forming a ground for similar comparative calculations.

To this may be added the following particulars of a comparative trial between stable-manure and crushed bones, lately made on the property of Sir William Maxwell, of Calderwood. The field was an old ley, consisting of strong loam, on a retentive clay bottom; but having been completely drained, as well as ploughed and cleared, under favorable circumstances, the condition of the land —from which the previous crop of oats had been taken in 1832—was perfectly satisfactory at the time of preparing it for turnips, with various species of which it was sown in the following spring; and in addition to the quantities of manure stated at foot, 7½ chaldrons of lime were laid per Scotch acre. Where the stable-manure had been applied, the plants sprouted more rapidly and vigorously than was the case with the bones; but ultimately the latter gained ground, and, if any thing, got rather the start of the dung, and no part of the crop suffered in any degree from the fly. The most accurate calculations were made in order to ascertain the produce of the crops per acre, and the following was the result:—

Swedish,		
30 cart-loads of stable-dung per Scotch acre, poduced		29 tons
60 bushels of crushed bones	,,	24
Dale's Hybrid,		
30 cart-loads of stable-dung	,,	33
60 bushels of crushed bones	,,	31
45 ditto	,,	29
Yellow Bullock,		
30 cart-loads of stable-dung	,,	29
60 bushels of crushed bones	,,	28

The quality of the soil is, however, by no means particularly well adapted for the turnip culture, partaking, as it does, rather too much of the clayey character; and although it was divested by drainage of all superfluous moisture, yet there can be little doubt that to that cause the comparatively unfavorable effect of the bones may be chiefly attributed.*

Effects of bone-dust and bones.

Bone-dust is the fittest state in which to lay it upon grass, for it will not only take more immediate effect upon the crop, but if laid in pieces, it would interrupt the progress of the scythe. It should, however, be recollected, that fine powder can only be obtained from spent bone which has undergone the process of manufacture. It is, therefore spread as a top-dressing, by hand; but it is also very commonly laid in the drills for turnips, for which purpose many ingenious machines have been contrived for sowing it along with the seed.† It is, however, much to be regretted that these implements cannot be constructed with more simplicity, for their cost is so considerable, that unless a man has a very large quantity of land to drill, their purchase would be imprudent, and the hire is generally unreasonably expensive.

Regarding the *quantity of dust*, the powdered bones are dearer than those which are merely broken small, and although said to be more forcing to the first crop, on account of their being, when in the state of powder, more intimately blended with the soil, and more directly applied to the seed, yet they are not found so durable as when they are laid on in pieces; but it is also true that, in the former case, they are not laid on so largely, for the amount depends entirely on the size of the bones. They have been applied, in the rough state, to the extent of 100 bushels per acre; but the average quantity, of all sizes, is stated, in the Doncaster Report, to be 39 bushels. When the smaller bones are distinguished from the larger, they, however, seldom appear to exceed 30 bushels per acre, and in many cases do not arrive at 20: perhaps it may be assumed, as the most general practice, that half-inch bones are employed at the rate of 25 to 30, and dust at 20 bushels per acre; but a distinction should be also drawn between the quantity of those which are applied after being manufactured, and those which are laid on in a raw state.

The size of the pieces to which the bones should be broken is also an object of some importance, as the smaller they are the more prompt will be their effect: on which, the following observation has been made by one of the correspondents of the Doncaster Association: "That if he meant to till for early profit, and if he wished to keep his land in good heart, he would use half-inch bones; and in breaking these, he should prefer some remaining considerably larger:" the reason assigned for which is, "that by using bones of a large size, with dust in them, there must be sufficient of the small particles of the dust to set the turnip crop forward, and sufficient of the large particles of the bone left to maintain the land in good condition for the last crop."

* Prize Essay of the Highland Society, N. S., vol. i. p. 74.

* Quart. Jour. of Agric., N. S., vol. iv. p. 839.

† A very detailed description of one of these instruments, along with an engraving, may be found in the Quarterly Journal of Agriculture, N. S. vol. ii. p. 719. Another machine for the same purpose, but with a double hopper, for sowing two drills at one time, is also described, together with a plate, in the Prize Essays of the Highland Society of Scotland: N. S., vol. ii. p. 206.

Respecting their durability, it has been affirmed, that the effect will not be increased if they be laid on to great amount; for the same produce has been obtained from the comparative application of 50 and 100 bushels; and an experiment has been tried by varying the quantity on different ridges of a large extent of ground under turnips, at the rate of 28, 40, and larger quantities alternately, without creating any visible difference in the crop*. This, however, may be perfectly correct, so far as regards one or two crops, for it has been found that, when used in large quantities, they have rendered the land extraordinarily productive during a great length of time, of which we find the following instances in the Doncaster Report:

1. On a field, part of which was boned forty years ago, the crops were, on that part, during fifteen or sixteen succeeding years, visibly better than the remainder, although the land was all of the same quality, and the part not boned was manured with farm-yard dung.

2. In another case, about three acres of light, sandy land were dressed, in 1814, with 150 bushels of bones per acre; since which time the land is said to have never forgotten it, but is nearly as good again as the other part, farmed precisely in the same way, with the exception of the one application of bones†.

We learn, also, from experiments at Kew, that although they yield a certain supply of nourishment to plants the moment they are capable of receiving it, yet that is done so gradually as to furnish only a regular and moderate supply: reasoning upon which, it is to be presumed, that as a large quantity does not produce the effect of forcing a crop in proportion to the amount supplied, neither can it be so soon exhausted by the gradual consumption of the smaller quantity. This application may therefore be perfectly consistent with good husbandry, if applied to any amount, however large; though, as regards the farmer's purse, the expenditure of the outlay is a different question. The extent of their fertilizing quality is greater upon grass-land, under cattle, than upon arable. Valuers estimate the allowance to a quitting tenant by supposing the effect of bones upon tillage and meadow-ground to be exhausted within four years; but on grass-land depastured it is considered to last during eight.‡

Experience seems to be in favor of laying the manure in *drills*, especially when applied to turnips, although the superiority of the *broad-cast practice* is maintained by some very intelligent farmers, who hold—that the turnip plant receives its support principally from the fibres which it throws out sideways, to a much greater length than people will believe, and derives more nourishment from them than the tap-root; and that the bones being dispersed, the fibres are more likely to meet with them than when they are accumulated round a tap-root, and that method must be the best which occasions the greater quantity of nourishment to be conveyed to the body of the turnip. In drilling the bones, there is also a difficulty found in the after-ploughing, of mixing them with the soil; and although this may be in some measure obviated by cross-ploughing the ridges, yet that portion of the land on which the manure is thus laid receives more than an equal degree of benefit. A third mode is however acted upon by others, who sow them broad-cast, and gather them into ridges with a mould-plough.

The *time for laying them upon the land*, when applied to grass, whether natural or artificial, is generally recommended to be early in the spring; but if upon meadow, the growth of which has been fed off, then the moment the cattle are removed. Experience, however, varies upon this point; because it has been found to depend materially upon the season and the state of the land, which, if wet, will be more benefited by delaying the operation until the weather becomes warm and the ground dry.

When applied in the drills of arable land, they are of course deposited along the seed; but when spread broad-cast, then they are not uncommonly either harrowed in immediately previous to the sowing, or with the last ploughing; though, when used in a fresh state, without having been subjected to process of manufacture, they should always be laid in sufficiently long before the sowing, to allow them time to ferment, or they will not take immediate effect upon the rising crop.*

The *soils to which they are best adapted* are those of a light and warm nature; for on wet and cold grounds they have rarely been found to produce any sensible benefit. Their power of contributing to lighten strong land, by their mechanical action upon the soil, and thus rendering it less adhesive, has indeed been vaunted, and, if laid on a very large amount, there can be no doubt that the bones, in pieces, would have some such effect; but the smallness of the quantity in which they are usually applied renders their force for that purpose quite insignificant.

On *heavy loams and clays*, the accounts of their operation have been almost invariably unfavorable; and it may be laid down as a necessary qualification in a soil fit for the application of bones, that it should be dry. This, indeed, has been contradicted by experiments stated in the Doncaster Report, upon what is described as a wet sand soil, with an irony-colored subsoil, upon which two quarters per acre were drilled, and produced an excellent crop, when manure had been previously tried without effect. This, however, having occurred in the years 1826 and 1827, which were unusually dry, may serve to explain the fact, without affecting the principle that bone manure is not generally beneficial to clay lands.

The same Report states, "*upon very thin sandy*

*Quart. Journal of Agric., N. S., vol. ii. p. 108.

† About sixty years ago, a farmer is also said to have obtained a forty-years' lease of a tract of poor land, in a high situation near Rochdale, in Lancashire, on which, after fencing and draining it, he erected a bone-mill, and began manuring the ground at the rate of 100 to 130 bushels of bones and dust per acre. The consequence of which was, that in a few years he let off more land than paid the rent of the whole, and retained a large farm in his own hand. The Correspondent of the Quarterly Journal of Agriculture, from whom these details are taken, says "that one acre would summer a cow of large size, and that some fields were cropped with oats ten or fifteen years in succession; yet that it is surprising to see the herbage which the land still produces, both as to quantity and quality, near one-half being white and marl clover.

‡ Report of the Committee of the Doncaster Agricultural Association, on bone-manure, p. 14.

* Doncaster Report, p. 16.

land, the value of bone-manure is not to be estimated; it is not only found to benefit the particular crop to which it is applied, but extends through the whole course of crops; and even in the succeeding courses, its effects are visible in the improved quality of the land, and the efficiency of a smaller quantity than would at first have insured a crop. Upon much of the high land about Babworth, which is a light sandy soil, the crops under ordinary farm management were comparatively unproductive; but since the introduction of bones, after having been dressed for several fallows with sixty or seventy bushels per acre, they have not only become productive, but so much improved in quality as to return an equal crop with a much lighter dressing of manure or bones throughout the next couse."

"On the *dry limestone* near Doncaster, the same favorable results have been obtained; and no failures, beyond those attributable to peculiarity of season, are noticed."

On the *Wolds of Yorkshire and Lincolnshire*, it also appears, by the testimony of several extensive farmers, that "before bones were generally used with turnip-seed, many thousand acres were annually sown for that crop without any manure whatever, from the impossibility of getting fold-manure for more than one-third or fourth of their fallows. The turnips upon such unmanured land were consequently very indifferent; and the benefit of sheep feeding upon their tops—for of bottoms they seldom had any—was very trifling. Since the use of bones has, however, become general, the turnip crop has been, in many instances, ten-fold, and in few less than four or five-fold its former bulk. All the succeeding crops of grain and seeds have been amazingly increased, and, upon the four or five-shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."

On *light loams*, the return on the Doncaster Committee give bones a preference to farm-yard dung. And we learn that, upon the calcareous soil of the Yorkshire Wolds, heavy crops of turnips have been raised from 16 bushels per acre of bones, while in the same field, and under similar circumstances, but manured from the farm-yard at the rate of from 8 to 10 tons per acre, the turnips have been of the most inferior description.

On *peat soils*, if previously drained and laid dry, their advantages are reported to be so striking, that from fifteen to twenty bushels of dust per acre, drilled, have been also found to very far surpass the ordinary dressing of stable-dung, and even of lime and pigeons' dung.

On *gravels*, the reports are meagre and contradictory, though perhaps reconcilable in principle, as it has been justly observed, that "a gravelly soil may embrace every variety of texture and quality, from the light dry sand to the water-logged yellow clay—preserving in each the necessary admixture of stones and grit." To wet gravel, their application has been found decidedly unfavorable.*

Analysis.

An examination of the component parts of soils, and of the power of bones, when applied to them as manure, would go far to explain the irregularity of their different effects upon various kinds of soil. Bone is known to consist of about equal parts of earthy and animal matter; the former chiefly composed of gypsum—which is of so indestructible a nature as to have been termed, by early chemists, the "earth of bones"—and a small portion of carbonate of lime; from which we may conclude that probably half the weight of bones is in the greater part consumed by plants as direct nourishment in their state of growth, and that the remainder is more gradually absorbed by the soil, as well also as by the plants; for lime, though in small amount, is always present, in greater or less quantity, in all vegetable substances.

"The quantity of earthy matter varies according to the age of the animal; and, in like manner, the quantity of animal matter varies also in proportion to the condition of the animal. In the best kinds of bones for manure, viz., those from fat young animals, perhaps the following proportions may give an approximation to the relative quantities of each in 100 parts:—

Earthy and saline matter - -	40	parts.
Cartilage and jelly - - -	40	
Fatty matter - - - -	20	

The soft parts thus form, in the best bone, about sixty, and upon an average, perhaps, amount to fifty per cent., which are almost entirely constituted of the same elements of plants, and all of them, sooner or later, liable to be dissolved and absorbed by the roots. The cartilage, indeed, when the bones have been buried in a dry situation, is very indestructible; but when exposed to the action of air, water, soil, and vegetation, probably pass into the state of jelly, and be dissolved, or otherwise decomposed, probably at the time when the fatty matter—the decomposition of which begins almost immediately—shall have been nearly exhausted."*

This analysis has been taken from an anonymous essay "on the action of ground bones on plants and soils;" the author of which observes, that "although it be granted that the composition of bones is thus well calculated to afford nourishment to plants, it must be admitted that the amount of their action as a manure still remains in a great measure unexplained. The quantity allowed per acre is not usually more than 10 or 15 cwt., of which not more than a half is efficient as manure; and this is but a small fraction of the weight which we carry off the field in vegetable produce. In these circumstances, we must either leave the matter unresolved, or have recourse to hypothetical explanation, to be confirmed or disproved by future observation." We agree with him in preferring the latter alternative, as best calculated to lead to a discovery of the truth; and as an inquiry into the cause of the different results occasioned by the specific application of bones to every species of soil would only lead us into a wide and probably fruitless discussion, we shall confine ourselves to an account of the analysis given by Mr. G. Sinclair, of the two kinds on which trials are mentioned by him to have been made in Oxfordshire.

That on the land of Sir Charles Throckmorton,

* Doncaster Report, p. 8.

* Quart. Jour. of Agric., N. S., vol. i. p. 49

on which the bone manure had such beneficial effects, contained in 400 parts :—

Fine siliceous sand, 167 parts; calcareous sand, 43; water of absorption, 99	309
Decomposing animal and vegetable matter, destructible by fire	24
Carbonate of lime (impalpable)	25
Silicia, or the pure earth of flints	23
Alumina, or the pure matter of clay	9
Oxide of iron	3
Soluble animal and vegetable matter principally vegetable extract, with indications of muriate of soda	5
Moisture and loss	2
	400

That on the land of Mr. Evans, jun., on which the bone manure appeared to have no beneficial effect, consisted of:—

Calcareous sand and gravel, nearly pure carbonate of lime	217
Decomposing animal and vegetable matters, destructible by fire	17
Carbonate of lime (impalpable)	39
Silicia	85
Alumina	20
Oxide of iron	5
Soluble matter, principally vegetable extract, with sulphate of lime, or gypsum	4
Moisture, or loss	13
	400

On which he remarks, that "the striking and essential point of difference between these two soils consists in the carbonate of lime. In the soil so much benefited by the bone manure, carbonate of lime is deficient, while in the soil so benefited by it, the carbonate of lime is almost in excess; at least, had it not been so much in the form of gravel and sand, the soil would have been what is termed cold. The differences, also, between these two soils, in the coarseness and fineness of their sand and gravel, and the superior quantity of alumina, or clay, in calcareous soil, should not be overlooked."

The quantity applied to the siliceous sandy soil, where the bones had such beneficial effects, was 36 bushels per acre, partly supplied from the dog-kennel, and partly purchased. On the calcareous soils, they were applied in a large quantity, and also in a recent state; on which Mr. S. observes, that "animal matter being so much more easily decomposed than vegetable matter, the recent bones must afford nutriment to the soil very speedily;" yet he adds, "that he has always found that both animal and vegetable matter, before they become beneficial to an immediate crop, require a first stage of decomposition, and that this degree of fermentation or decomposition is best effected before these substances are applied to the land."

This accords with the report of the Doncaster Association, in which it is said "to be acknowledged by their correspondents to be a prevalent opinion among intelligent farmers, that manufactured bones are equal in their effect to raw bones;" in proof of which they instance the following experiments :—

Twenty-four acres having been boned at the rate of 50 bushels per acre, part with bones which had the oil stewed out of them, another part with bones which were full of marrow, and a third part with horses' bones having much flesh upon them. The crop, which was turnips, was all good, but the next crop, where the fleshy bones were laid, was not so good.

Broken bones fresh from dog-kennels were spread on a newly-ploughed clover ley of high sand land, at the rate of 80 bushels per acre, and on the following day sown and harrowed in with wheat; but the crop was bad, and no advantage was observed to be derived from the bones in the succeeding crops. The same experiment was repeated upon a piece of fallow in Blyth Forest, sown with turnips, with similar results; but the same gentleman having sent bones from the dog-kennels to be broken, and then laid upon a heap, and covered with earth, in which state they remained for about a month, after which they were laid upon turnips: their good effects were visible on every yard on which they spread, being the largest and the best turnips in the field, although the other part was manured from the farm-yard, where a considerable quantity of oil-cake had been consumed.

These experiments certainly tend to confirm the fact, that fermentation is requisite to give immediate effect to bones as manure, which is only in accordance with the chemical principles applicable to all animal substances; for we all know, that although flesh, if buried in the earth, will not produce any benefit to the land until it is decomposed, yet that object once attained, its fertilizing powers are instantly brought into force; but we cannot admit that this warrants the conclusion, "that manufactured bones are equal in their effect to raw bones." They may indeed be superior on a first application; and we make no doubt that when thrown together and rendered putrid, they will become more promptly available than if they had undergone no fermentation whatever. Yet we feel persuaded, both from the nature of animal matter as manure, as well as from much inquiry regarding the practical application of bones, that when deprived by manufacture of the gelatin and oil which they contain, their improvement of the land will not be so durable as when they are laid on raw, or after fermentation when collected in a fresh state.* Many farmers are thus imposed upon by dealers; but the bones are sold to those who are aware of their real value, for much less than the price of those from which the oily substance has been extracted.

Composts.

The fermentation of bone naturally leads to the consideration of the subject of forming *a compost of bones with earth and other substances*, by a mixture with which they soon become decayed and pulverized—a practice which is stated in the Doncaster report to have been recommended by several very intelligent farmers, thirteen of whom, solely from the result of their own experience, describe its effects as superior to those of bones used singly. With some of these, it is the practice to mix 50 bushels of bones with 5 loads of burnt

* Besides the various modes already in use of drawing oil and spirits from bones and horn, the cotton manufacturers in Lancashire are said to have lately used a glutinous substance, extracted from bones, in the fabrication of the weft of their low-priced cloth: and there are now a number of manufactories of this newly-discovered matter.

clay, or good earth, per acre; by which dressing, the crops between fallow and fallow, excepting clover, appear to have been increased one-fifth in value. Others use forty bushels of bones, broken from two to three inches, in a compost with five loads of farm-yard manure, and a sufficient quantity of earth, the effect of which has been felt on the wheat crop at the end of the four-course system. Many also mix up dung, root, rape-dust, and the ashes from weeds and house fires, with the bones, by which great heat, and consequent fermentation, is occasioned.

The most general practice, however, is to form the compost entirely of bones and yard muck, mixed, in various proportions, with

From 50 bushels of bones	to	4 or 5	of dung.
20	do.	4	do.
12	do.	8	do.

This, if the heap be well covered, will no doubt decompose the bones very rapidly; and one person states, "that he has used as much as 35 bushels of bone dust, per acre, without manure, in the same field where he laid six loads of fold manure, and ten bushels of bone dust; but the turnips on the part manured with bone dust alone were not so good as those on the part manured with the compost and the succeeding crops were still worse in comparison."

As the great amount of bones now actually consumed as manure, besides the quantities applied to other purposes, may reasonably excite an apprehension that the still increasing demand will soon exceed the supply and consequently raise the price, a correspondent of the "Quarterly Journal of Agriculture,"* has suggested the following economical method of employing them, which he has used for the two last years, and by which he states that he has obtained heavy crops of turnips.

He forms a compost, as the manure for one imperial acre, of 8 bushels of coarse bone-dust, with no less than double that quantity of coal-ashes, which may be generally procured for about 5s. per ton. The ashes should be carefully collected in dry weather and placed under cover, in order that they may be kept free of moisture; or, if that be difficult, they may be strewed with a dusting of quick-lime: after which they are to be riddled as small as the dust itself, for otherwise, if sown with a drilling-machine, they will not pass easily through the hopper. The bones are then mixed with the ashes; the mass ferments, and evolves a considerable degree of heat, when they soon become fit for use.

Turnips raised with this compost, he affirms to have always possessed the same characters of a close crop, firm root, and hardiness to resist the rigors of winter, that turnips raised with bone-dust alone evince; in proof of which, he has sold them for £7 per acre, to be eaten off by sheep. He, however, supposes that it is the bone-dust alone which secures to the crop whatever nourishment may be imparted to it at the future stages of its growth, in which he is doubtless correct; but in imagining that he has thus discovered a more economical mode of their application in their effect upon succeeding crops, we imagine that his further experience will show him that he has been deceived; for although the fermentation of the bones, occasioned by the application of the ashes, may increase their power upon the actual crop, it will be proportionably diminished in those which follow, and we think that the instances which we have already stated must convince practical men that the durability of their influence upon the soil depends on the quantity in which they are applied.

*N. S. Vol. ii. No. 20. p. 258.

Application.

Independently of the decided fertilizing properties of bones, when applied to dry and light soils, they have the great advantage of being procurable at a small expense of carriage, which diminishes the labor of teams to a great extent; for one wagon-load of 100 bushels, broken small, will in most cases be found equal to 40 cart-loads of yard manure. They are also capable of being preserved during a long time, when kept dry, without incurring damage, and thus may be stored up during the winter season, when farm business is not pressing; added to which, they leave the land freer from weeds than when it is manured with dung. This, and their suitableness to the drill husbandry, renders them peculiarly adapted to the cultivation of turnips—to which, indeed, they have been the most universally applied; and we need not remind our readers, that on the success of that crop generally depends those of the whole succeeding course. The instances are also numerous, upon all soils, of turnips being destroyed by the fly when sown in drills, having had the manure placed directly under them; when turnips sown in the same field, and on the same day, with bone-dust, have entirely escaped their ravages. Their value to the holders of light soils, in thus enabling them to procure the certain means of improving the returns from their land, by this increase of their quantity of nutritive manure, may therefore be considered inappreciable. It has been stated as the comparative result of some experiments, that bone-dust acts in the cultivation of grain, as compared to the best stable manure, in the following proportions:—namely,

In respect to the quality of the corn, as	7 to 5.
In respect to the quantity, as	5 to 4.
In respect to the durability of its effects on the soil, as	3 to 2.*

We cannot indeed agree altogether in this estimate of its powers, but it requires no further arguments to press its application upon the attention of every farmer, who is in possession of ground to which it is suitable. We shall, therefore, only add the following summary of the rules for its application, as recommended by the members of the Doncaster Agricultural Association, from which it appears—

That on dry sands, limestone, chalk, light loams, and peat, bones are a very highly valuable manure.

That they may be applied to grass with great good effect.

That on arable lands, they may be laid on fallow for turnips, or used for any of the subsequent crops.

That the best method of using them, when broad-cast, is previously to mix them up in a compost with earth, dung, or other manures, and let them lie to ferment.

* Repertory of Inventions, No. 86.

That if used alone, they may either be drilled with the seed, or sown broad-cast.

That bones which have undergone the process of fermentation are decidedly superior (in their immediate effects) to those which have not done so.

That the quantity should be about 20 bushels of dust, or 40 bushels of large, increasing the quantity if the land be impoverished: and also, according to our opinion, if the bones have been already manufactured.

That upon clays and heavy loams, it does not yet appear that bones will answer.

On this latter observation, however, a farmer near Nantwich, Cheshire, remarks, that he "occupies a farm in the township of Pickmore, the soil of which is a clay loam, scarcely twelve inches deep, the sub-soil a grey sand, mixed with coarse clay—which the farmers call *rammel*—on a bed of good clay marl. Two years ago, he covered the field with bone-manure; previous to which the grass was so sour, as not to be worth ten shillings per acre; but is now full of most excellent herbage, consisting of white clover and trefoil;" to which he adds, that "in another of his fields, with a clay soil, a small portion of it was manured, thirty-two years ago, by a former tenant, with bones; and that, although it has been twenty years in tillage, yet that part still shows a superiority over the rest."*

From the History of Insects in the Family Library.

NATURAL HISTORY OF ANTS.

Their Industry—Affection for their Young—Courage—Their Anger—Unite in Myriads for War and Extermination—The Fallow Ants—The Sanguine Ants—The Legionary Ants—Attack other Ants, and raduce them to Slavery.

The history of the insects now to be described, presents examples of an industry which has become proverbial, and traits of affection and feeling which would do honor to our own species. Love and courage, patience and perseverance, almost all the higher virtues of human nature, when arrived at the highest pitch of earthly perfection, seem to be the ordinary springs of action in the ant.

Of ants, as of other social insects, the largest portion of the community consists of neuters; beings possessing the most exquisite sentiments of maternity unalloyed by passion; so that from their birth to their death they live, think, and act only for the offspring of another.

The instincts of this insect are, indisputably, more extraordinary than those of any other in the whole range of animated nature. The ancients magnified them into fabulous miracles. Pliny talks of an Indian ant as big as an Egyptian wolf, of the color of a cat, which entered the bowels of the earth in search of gold, of which they are said to have been plundered during the winter by the human inhabitants of those regions.

But exaggeration and credulity apart, the real habits and proceedings of these insects are so extraordinary, that they would stagger our belief, if not confirmed by such observers as Huber and Latreille.

Their nests contain three kinds of individuals—males; females, which have wings; and neuters, which are destitute of these appendages.

"In the warm days which occur from the end of July to the beginning of September, and sometimes later, the inhabitants of the various species of ants may be seen swarming with winged insects; these are the males and females, preparing to quit for ever the scenes of their nativity and education. Every thing is in motion; and the silver wings, contrasted with the jet bodies which compose the animated mass, add a degree of splendor to the interesting scene. The bustle increases, till at length the males rise, as it were, by general impulse into the air, and the females accompany them: the whole swarm alternately rises and falls with a slow movement, to the height of about ten feet; the males flying obliquely with a rapid zigzag motion, and the females, though following the general movement of the column, appearing suspended in the air, like balloons; and having their heads turned towards the wind."

Sometimes the swarm of a whole district unite their infinite myriads, and seen at a distance, says M. Gliditsch,* produce an effect very much resembling an aurora borealis, when from the border of the cloud appear several columns of flame and vapor, attended with a variety of luminous rays and lines resembling forked lightning confined in its brilliancy. The noise emitted by the countless myriads of these creatures is not so loud as the hum of a single wasp, and the slightest breath scatters them abroad. In the midst of these numberless males the females become fecundated, and the greater portion of the former sex immediately perishing, become the food of birds or of fish. So numerous are they, that Dr. Bromley says they formed a column on the water where they had fallen, five or six miles long, eight or ten feet broad, and six inches deep.

The females which escape are destined to found new colonies, and at first to do all the work of neuters; in this particular resembling the mother wasp: but prior to their constructing a new habitation, they make themselves voluntary prisoners, by throwing off their wings. So extraordinary a dismemberment requires to be supported by the testimony of an eye-witness.

Accordingly, Huber, who made the experiment, states, "that having induced an ant to mount a straw, he placed it on a table sprinkled with a lit-

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* New Farmer's Magazine, No. 82, December, 1833.

*A species of ant, called by Linnæus the *formica sacchivora*, appeared in such torrents in the island of Granada, and destroyed the sugar-canes so completely by undermining their roots, that a reward of £20,000 was offered to any one who should discover an effectual mode of destroying them.

They descended from the hills in a flood, and filled not only the plantation, but the roads for miles. Domestic quadrupeds perished; and rats, mice, and reptiles, were devoured by them, and even birds were so harrassed when they alighted as quickly to die. Nothing opposed their march: they blindly rushed into the streams and were drowned in such countless myriads, that the aggregation of their tiny carcasses dammed up the waters, and formed a bridge for others to pass over. The large fires lighted in their paths were speedily extinguished by the rush of their masses, and had not Providence swept them away in the torrents of a terrible hurricane in 1780, every thing must have fallen before them.—*Introduction to Etymology*, vol. i. p. 85.

tle earth, and covered with a glass bell; scarcely did she perceive the earth which covered the bottom of her abode, when she extended her wings, with some effort bringing them before her head, crossing them in every direction, throwing them from side to side, and producing so many singular contortions, that her four wings fell off at the same moment, in his presence. After this change, she reposed, brushed her corslet, traversed the ground, evidently seeking a place of shelter; she partook of the honey he gave her, and at last found a hiding place under some loose earth."

Huber might well be astonished at the coolness with which the female ant appeared to throw off her wings: one would have thought that as much proportionate suffering would have been felt in her tiny frame, from the loss of these members, as in ours from the amputation of all our limbs; but insects in general do not appear to be sensible of much pain. A wasp will walk about, and even eat, after his body has been cut into two, and a dragon fly will voraciously devour its prey after the removal of its abdomen.

Having cast off its wings, the fecundated female begins to prepare a habitation for herself. In some cases, however, the workers do not allow all the females to quit the old nest; but detaining some of those which have been impregnated, clip their wings and keep them close prisoners so long, that at last they become reconciled to their fate, and prepare to lay eggs. As if still afraid that the impregnated female should depart, a single ant is appointed to watch her motions and supply her wants; no Argus appears to be more vigilant: it mounts on her abdomen, resting its two posterior legs on the ground: these sentinels are constantly relieved. As soon as an egg is deposited, the female becomes the object of the tender care of the neuters, and as a mother she receives those attentions which she would in vain have solicited as a virgin. A court, composed of from ten to fifteen individuals, says Huber, continually follows her; she is unceasingly the object of their care and caresses; all are eager to collect around her, offer her nourishment, and assist her with their mandibles in making her way through difficult and ascending passages; they also lead her through all the different quarters of the ant-hill. The eggs taken up by the laborers at the instant of their being laid, are collected around her. When she seeks repose, a group of ants environ her; several females live in the same nest, and show no rivalry; each has her court, they pass each other uninjured, and sustain in common the population of the ant-hill; but they possess no power, which it would seem is lodged exclusively with the neuters.

"In whatever apartment," says Gould, "a queen condescends to be present, she commands obedience and respect; a universal gladness spreads itself throughout the whole cell, which is expressed by particular acts of joy and exultation. They have a peculiar way of skipping and leaping, and standing upon their hind legs, and prancing with the others. These frolics they make use of, both to congratulate each other when they meet, and to show their regard for their queen; some of them gently walk over her, others dance around her, and she is generally encircled with a cluster of attendants."

Their affection is extended, it would appear from Huber, even beyond life; for when a pregnant female dies, five or six laborers rest near her, and for some days lick and brush her constantly, either with a hope to revive that little particle of cherished dust, or as a tribute of their instinctive love for the departed.

If we observe the ant-hill, we shall see so many traits of this affection of the worker towards the female, as to satisfy us that the imprisonment and mutilation she had undergone at the hands of the former are dictated alone by that instinct which prompts the ant to continue its kind. The republic of ants is not annually dissolved like that of bees and wasps.

Attachment to the female is not the only instance of affection evinced by these insects; they, as well as bees, appear to recognize each other even after a long absence. Huber, having taken an ant-hill from the woods, placed it in his glass hive; finding that he had a superabundance of ants, he allowed some of them to escape, and these formed a nest in his garden. Those which were in the hive he carried into his study, and observed their habits for four months, after which period he placed the hive in the garden within fifteen paces of the natural nest. Immediately, the ants established in it recognized their former companions, with whom they had held no communication for four months; they caressed them with their antennæ, and taking them up in their mandibles, led them to their own nest. Presently others arrived in crowds and carried off the fugitives in a similar manner; and venturing into the artificial ant-hill, in a few days caused such a desertion that it was wholly depopulated.

The above anecdote seems to prove that ants have a language of dumb signs of which the organs are the antennæ. As yet the proofs of this antennal language have been drawn from the affections of these creatures, but more striking ones are derived from their passions. For there are few animals in which the passions assume a more deep and threatening aspect; they unite them in myriads for the purposes of war and extermination.

It would perhaps be too much to say, that the warfare which takes place among ants calls forth bright traits of character, and occasions the exercise of virtues which under no other combination of circumstances could be exhibited. Yet Latreille, after he had cut off the antennæ of an ant, saw another approach it as if compassionating the loss of a member as dear to the owner as the pupil of our eye to us, and after caressing the sufferer, pour into the wound a drop of a liquid from its own mouth.

The causes which give rise to these wars are, no doubt, as important to them as those which urge human monarchs to devastate, and human heroes to struggle for victory. The ants will dispute furiously about a few square feet of dust; and such an object is of equal magnitude and importance to them, as a river, or a mountain, to an emperor. Sometimes a straw, the carcass of a worm, a single grain of wheat, will cause myriads to engage in deadly strife, and leave the miserable inches of surrounding earth thickly strewed with the pigmy dead. Sometimes a nobler aim will cause them to defend to the uttermost their homes and their young, from the marauding ambition of a neighboring hill. "Alas!" says Bacon, "the earth, with men upon it, will not seem much

other than an ant-hill, where some ants carry corn, and some carry their young, and some go empty, and all to and fro around a little heap of dust."

"If we wish to behold," says P. Huber, "regular armies wage war in all its forms, we must visit the forests in which the fallow ants establish their dominion over every insect within their territory: we shall there see populous and rival cities and regular roads, diverging from the ant-hill like so many radii from a centre, and frequented by an immense number of combatants; wars between hordes of the same species, for they are naturally enemies, and jealous of any encroachment upon the territory which surrounds their capital. It is in these forests I have witnessed the inhabitants of two large ant-hills engaged in a spirited combat; two empires could not have brought into the field a more numerous or more determined body of combatants.

"Both armies met half-way from their respective habitations, and the battle commenced: thousands of ants took their stations upon the highest ground, and fought in pairs, keeping firm hold of their antagonists by their mandibles; while a considerable number were engaged in the attack, others were leading away prisoners; the latter made several ineffectual endeavors to escape, as if aware that upon reaching the camp a cruel death awaited them. The field of battle occupied a a space of about three feet square: a penetrating odor exhaled on all sides; and numbers of dead ants were seen covered with venom. The ants composing groups and chains laid hold of each others legs and pincers, and dragged their antagonists on the ground; these groups formed successively. The fight usually commenced between two ants, who seizing each other by the mandibles raised themselves upon their hindlegs, to allow of their bringing their abdomen forward, and spurting their venom upon their adversary: they were frequently so wedged together, that they fell on their sides, and fought a long time in that situation in the dust: shortly afterward they raised themselves, when each began dragging its adversary; but when their force happened to be equal, the wrestlers remainded immovable, and fixed each other to the ground, until a third came to decide the contest. It more commonly happened that both ants received assistance at the same time, when the whole four, keeping firm hold of a foot or antenna, made ineffectual attempts to win the battle. In this way they sometimes formed groups of six, eight, or ten, firmly locked all together; the group was only broken, when several warriors from the same republic advanced at the same time, and compelled the enchained insects to let go their hold, and then the single combats were renewed: on the approach of night, each party retired gradually to their own city.

"On the following day, before dawn, the ants returned to the field of battle—the groups again formed—the carnage recommenced with greater fury than on the preceding evening, and the scene of combat occupied a space of six feet by two: the event remained for a long time doubtful; about midday the contending armies had removed to the distance of a dozen feet from one of their cities, whence, I conclude, that some ground had been gained: the ants fought so desperately, that they did not even perceive my presence, and though I remainded close to the armies, not a single combatant climbed up my legs.

The ordinary operations of the two cities were not suspended, and in all the immediate vicinity of the ant-hills order and peace prevailed; on that side on which the battle raged alone were seen crowds of these insects running to and fro, some to join the combatants, and some to escort the prisoners. This war terminated without any disastrous results to either of the two republics; long-continued rains shorted its duration, and each band of warriors ceased to frequent the road which led to the enemy's camp."

The astonishing part of this singular detail is, the instinct which enables each ant to know its own party. Of the same species, alike in form, size, faculties and arms, it yet rarely happens that two of the same side attack each other; and when this takes place, says Huber, "those which are the objects of this temporary error caress their companions with their antennæ, and readily appease their anger." We can comprehend the existence of an instinct which shall, at all times, cause an animal to build its habitation after a distinct fashion, but a spontaneous combination of faculties seems to take place in the conduct of these wars. The insects march, countermarch, take prisoners, distinguish each other, retreat; in short, do all that man would do under similar circumstances. Nothing like the fatality of instinct is perceptible. These wars were accidental, might never have happened, and perhaps only happen in one community out of ten. Neither are they conducted alike in all cases, but are obviously modified according to the varying circumstances of time and place. These very fallow ants, when they attack the sanguine ants, for example, adopt a system of ambuscade and stratagem; and the sanguine ants, if too hardly pressed, send off a courier to their ant-hill for farther assistance, and immediately, says Huber, a considerable detachment leaves the sanguine city, advances in a body, and surrounds the enemy.

That ants, being such determined warriors, should occasionally have games of mimic war is is not surprising. "I visited," says Huber, "one of the fallow ant-hills, exposed to sun, and sheltered to the north: the ants were heaped on one another, enjoying the temperature of the surface of the nest; none of them were at work. This immense multitude of insects presented the appearance of a liquid in a state ebulition, upon which the eye had some difficulty in resting: but when I examined the conduct of each ant, I saw them approach each other, moving their antenæ with astonishing rapidity; with slight movements of their fore-feet they patted the lateral parts of the head of the other ants. After these gestures, resembling caresses, they were observed to raise themselves on their hind-legs, by pairs struggle together, seize each other by a mandible, foot, or antenna, and then immediately relax their hold to recommence the attack. They fastened on the thorax, or abdomen, embraced and overthrew each other, then raise themselves by turns, taking their revenge without producing any mischief. They did not spurt forth their venom as in their hostile combats, nor retain their adversary with the obstinacy which they manifest in their serious quarrels. I frequently visited this ant-hill, which almost always presented the same spectacle, but

I never saw any quitting it wounded or maimed: thus there is reason to believe that, industrious as they are, the ant has its hours of repose, and its season for enjoyment; its serious duties, and its pleasurable gambols."

Connected with the subject of the warfare of ants is the history of a species of this insect, not existing in these islands, called, by Huber, the Amazon, or Legionary Ant, *Formica rufescens* of Latreille. It is both warlike and powerful, and, unlike the rest of the tribe, its habits are far from being industrious. Enough has been said to show that the proceedings of some insects so nearly resemble human actions, as to excite our greatest wonder: but the habits of the legionary are still more surprising than the proceedings of the chiefs which we have just described; it is actually found to be a slave-dealer, attacking the nests of other species, stealing their young, rearing them, and thus, by shifting all the domestic duties of their republic on strangers, escaping from labor themselves. This curious fact, first discovered by Huber, has been confirmed by Latreille, and is admitted by all naturalists. The slave is distinguished from its master by being of a dark ash-color, so as to be entitled to the name of Negro—an epithet now appropriated to the *Formica fusca*, or ash-colored ants. Their masters are light in color. The negro, is an industrious, peaceable, stingless insect; the legionary, a courageous, armed, and lazy one. The relation between them is not, however, that which subsists between a task-master and his bondsman, but a strong attachment is mutually felt—another instance of the modification of instinct, education obliterating in the ash-colored ant all is natural antipathy to another species. All that we know concerning these extraordinary creatures being derived from Mr. P. Huber, the following is a short summary of his account.

While walking near Geneva, between four and five in the evening of the 17th of June, 1804, this distinguished naturalist observed an army of the rufescent or legionary ants traversing the road. The column occupied a space of ten inches in length, by four in breadth; they rapidly quitted the road, passed a thick hedge, entered a pasture-ground, wound through the grass without breaking the line of march, and approached a nest inhabited by the negro or ash-colored ant. Some of its inhabitants were guarding the entrance, but on the discovery of an approaching army, they darted forth on the advancing party. The alarm was communicated to the interior, whence their companions rushed in numbers to join in the defence of their underground residence. The bulk of the army of the legionaries being about two paces off, now quickened their march, and in an instant the whole battalion fell upon and overthrew the negroes, who, after a short and obstinate conflict, retired and took refuge in the lowest parts of the nest. The legionaries now mounted the hillock; some took possession of the principal avenues, while others effected a new breach with their teeth, so as to admit the remainder of the army. Having thus taken the city by assault, they remained in it only a few minutes: returning by the apertures through which they had entered, each carried in its mouth either a larva or a pupa, and scampered away without order or regularity. M. Huber followed them for some time, but lost sight of them in a cornfield. Wishing to observe the assaulted city again, he retraced his steps, and saw a small number of ash-colored laborers perched on the stalks of plants, holding in their mouths the few larvæ which they had succeeded in rescuing from pillage.

The next morning, Huber, taking the same road, with the hope of once more seeing a similar scene, discovered a large ant-hill tenanted by legionaries. At five in the evening, provided the weather be fine, and the temperature 67° Farenheit in the shade, these sally out. During the other part of the day they appear to do little; but at this hour they become restless, assemble on the outside of the city, move round it in circles: a signal is then given, which they pass from one to the other, striking, as they proceed, with their antennæ and forehead, the breasts of their companions; these in their turn, approach those advancing, and communicate the same signal—it is that of departure—as the result satisfactorily proves. Those which receive the intimation are instantly seen to put themselves on the march; the column becomes organized; and not a single amazon remains near the garrison. There is no commander-in-chief, every ant is in turn first, each seeking to be foremost. A small number may, however, be observed constantly returning to the rear: this is probably the means by which the whole army is governed.

With such dispositions, manœuvres, and discipline, Huber saw an army of legionaries set out for a negro city. With their usual impetuosity of attack, one party soon entered, and returned laden with the young of the assailed ant-hill; a second detachment, not meeting with equal success, separated from their companions, and fell on another negro colony, where they met with ample booty; after which the whole number of legionaries marched to their nest in two divisions. As they approached, Huber, saw, to his astonishment, a great number of the very same species which had been pillaged, all around the nest of the legionaries. Was this a diversion made by carrying the war into the enemy's territory? No: the return of the legionaries excited no alarm; on the contrary, the negro ants were seen to approach these warriors, caress them with their antennæ, offer them nourishment, as is the custom among their own species, while the legionaries consigned their prisoners to them to be carried to the interior of the nest.

In this way the same negro colony was observed to be attacked three several times, and each time with complete success; the last attack, however, was made under different circumstances from the first two: the negroes, as if conscious of their exposed situation, had lost no time in throwing up trenches, barricading the several entrances, and reinforcing the guard of the interior; "they had moreover, brought together all the little pieces of wood and earth within their reach; with these they had blocked up the passage to their habitation, in which they had posted themselves in full force."

"The legionaries at first hesitating to approach, rambled about or returned to the rear; they then on a given signal rushed forward *en masse*, with great impetuosity, removing with their teeth and feet the many obstacles which impeded their progress: having succeeded, they entered the ant-hill by hundreds, notwithstanding the resistence of its

inhabitants, and carried off their prize to the garrison."

In these attacks the legionaries never take the old negroes prisoners, knowing perhaps that at an adult age the love of home, with all its associations, would be sad obstacles to transplantation; nor is their contest attended with loss of blood; they seek the young, and these being obtained, they speedily decamp with their booty. Nor do they ever begin their predatory warfare before the end of May, or beginning of June; if they commenced at an earlier period to purloin the young negroes, they might secure a large supply of captives, but then it would principally consist of males and females, and these it seems nature does not permit them to seize: for she has ordained that, in the ant-hills destined to pillage, the males and females shall be produced earlier than the males and females shall be produced earlier than the males and females of the legionaries; and it is only after their own males and females have undergone the last change, that the instinct which prompts them to steal the young of others begins to operate. Hence, Huber has distinctly ascertained, and Latreille has confirmed the discovery, that the legionary ant-hill contains male, female, and neuter amazons, together with negro-neuters, but never negro males or females. The *amazon* female, after having cast off her wings, lays the foundation of her own nest, and performs all the duties of a laborer. There is no doubt that these creatures have the ability to work, and do so; but as soon as they obtain slaves to do that for them which they ought to do themselves, they relinquish every domestic duty, and during the day "tranquilly wait, at the bottom of their subterranean abode, the hour of departure, reserving their strength, courage, and the address which they so well know how to display, for the purposes of war."

On the negroes reared among them they depend not only for house and home, but even for food; and these faithful and affectionate servants begrudge neither labor nor pains, in providing for their masters. Huber enclosed thirty amazons with several pupæ, and larvæ of their own species and twenty negro pupæ in a glass box, the bottom of which was covered with a thick layer of earth; honey was given to them, so that, although cut off from their auxiliaries, the amazons had both shelter and food: at first they appeared to pay some little attention to the young; this soon ceased, and they neither traced out a dwelling, nor took any food; in two days one-half died of hunger, and the other remained weak and languid: commiserating their condition, he gave them *one* of their black companions: this little creature, unassisted, formed a chamber in the earth, gathered together the larvæ, put every thing into complete order, and preserved the lives of those which were about to perish.

In order to obtain a more intimate knowledge of the facts, the same observer of nature opened and deranged an ant-hill in which the negroes and amazons dwelt together; in doing so, the aspect of their city was so altered as not to be recognized by the amazons. and they were seen wandering at random over its surface. The negroes, however, appeared to be well acquainted with the new localities of the ant-hill, and relieved them from their embarrassment, by taking them up gently in their mandibles, and conducting them to the galleries already pierced. "An amazon was frequently seen to approach a negro, and play upon its head with its antennæ, when the latter immediately seized the former in its pincers, and deposited it at one of the entrances; the amazon ant then unrolled itself, caressed once more its kind friend, and passed into the interior of the nest; and then the negro lost its way too, and wandered about carrying the amazon.

"I observed one," continues Huber, "after ineffectual windings, take the precaution of laying its burden on the ground: the amazon remained on the same spot until the negro returned to its assistance, which having well ascertained and examined one of the entrances, resumed its load, and bore it into the interior."

If the entrance to any gallery happened to be obstructed, the negro, depositing its burden, went to remove the obstruction, and again taking up the amazon, introduced it into the nest. It often happens that the ant-hill is not sufficiently commodious, in this case the negroes alone decide upon the expediency of a removal, and choose a spot for the new dwelling; they set about building, and as soon as the works are sufficiently advanced, appear eager to conduct the legionaries to the new city: for this purpose, each negro takes up an amazon, which it carries to the chosen spot, so that a long line of these faithful creatures may be seen extending all the way from the old to the new town; their charges are then deposited at the various entrances, when other negroes come out, welcome their arrival, and usher them into the interior of their new abode.

The negro is not the only species of ant subjugated by the legionaries. The mining ants are attacked for a similar purpose; but as these are a much more resolute race than the pacific ash-colored tribe, the legionaries are obliged to vary their tactics.

In one of these forays, the amazons," says Huber, "proceeded like a torrent along a deep dike, and marched in a more compact body than ordinary, and in a short time reached the nest they proposed to attack. As soon as the legionaries began entering the subterranean city, the miners rushed out in crowds, and while some fell upon the invaders with great spirit, others passed through the scene of contest solely occupied in bearing off to a place of safety their larvæ and pupæ."

The amazon army was often despoiled of its booty, but their superiority address and agility at length gave them the advantage, and in a quarter of an hour they were seen returning homewards loaded with prey—not, however, straggling, and a file, as after an assault upon the negroes, but in a compact mass; a precaution so much the more necessary, as the courageous miners disputed every inch of ground, following and attacking them until they arrived within ten paces of the amazonian citadel.

Besides the amazons, there is another slave-making species, called the *formica sanguinea;* a species which has not as yet been discovered in this island. They are larger than the legionaries: unlike them, however, they share the labor with their slaves. Their mode of attack is very different from that of the legionaries; the latter carry every thing by sheer impetuosity; the former never pour in immense masses, but attack in small

divisions: they sometimes go one hundred and fifty paces, to attack a negro habitation, and the various divisions succeed each other by means of couriers, which are evidently sent off to fetch assistance from the garrison.

"On the 15th July, at 10 A. M.," says Huber, "a small division of sanguine ants was despatched from the garrison, and arrived in quick march near a nest of negro ants, situated twenty paces distant, around which they took their station. The inhabitants perceiving the strangers, rushed forth, and made several prisoners; the sanguine ants advanced no farther: they appeared to be waiting for reinforcements; from time to time, little companies arrived from the garrison to strengthen the brigade: thus reunited they advanced a little nearer, and seemed more willing to run the risk of a general engagement; but in proportion as they approached the negro dwelling, the more solicitous did they seem to despatch couriers to the garrison, who, arriving in great haste, produced considerable alarm, when another division was immediately despatched to join the army. The negroes took up a position of about two feet square, in front of their nest, where nearly their whole force was assembled, awaiting the enemy." In the interim, the pupæ were removed to the side of the nest facing the field of battle, so that they might be conveyed away at a moment's warning, affording a trait of what Huber calls prudence, and certainly a marvellously singular one it is. When fighting with the amazons, the impetuosity of the attack leaves the negro-ant no time for thought, but in their contests with the sanguine ant, they vary their tactics so as to meet the new circumstances. The latter instances being sufficiently reinforced, make the attack, and band after band pillage and carry away their booty, not in a few minutes, as is done by the amazons, but during the whole day; and if the pillaged city should suit them better than their own, they remove to it on the following morning; at least so it appears in an instance observed by Huber. It is rare, according to that author, that they do not change at least once during the year. They certainly inspire the negroes with great terror, for these, once attacked by them, generally forsake their nest forever.

"To their own slaves they are much attached; the sanguine ants are often besieged by the fallow ants: on these occasions they carry their servants to the lowest chambers, and these, as if aware of the intention of their removal, immediately begin barricading the different entrances, with every species of material lying within their reach.

"The sanguine ants evince extraordinary foresight in these engagements; for while one party is fighting, another is engaged in bearing away the negroes, who immediately begin constructing a new dwelling at a considerable distance from the scene of combat."

Such is is the extraordinary recital contained in that delightful work of Huber's, every fact of which has been confirmed by the subsequent observations of the accurate and learned Latreille. It would seem that the negro and miner ants are both occasionally enslaved and dwelt together in the sanguine ant-hills. And Huber has brought up legionaries and sanguine ants, which are both slave-makers, with negroes, in one common dwelling.

[From the London Mechanics' Magazine.

THE ICE TRADE BETWEEN AMERICA AND INDIA.

The arrival of the Tuscany with a cargo of ice from America forms an epoch in the history of Calcutta worthy of commemoration, as a facetious friend remarked, in a medal of *frosted* silver. In the month of May last we received a present of some ice from Dr. Wise, at Hugil, (whose efforts have been so long directed to the extension of its manufacture by the native process,) as a proof that the precious luxury might be preserved by careful husbandry, until the season when its coolness was the most grateful: little did we then contemplate being able to return the compliment, with a solid lump of the clearest crystal ice at the conclusion of the rains! nor that we should be finally indebted to American enterprise for the realization of a pleasure for which we have so long envied our more fortunate countrymen in the upper provinces; nay, even the beggars of Bokhara, who in a climate at times more sultry than ours, according to Lieutenant Burnes, "purchase ice for their water, even while entreating the bounty of the passenger." Professor Leslie with his thousand glass exhausters, and his beautiful steam-air pumps, tantalized us with the hopes of a costly treat, and ruined poor Taylor, the bold adopter of his theory; but science must, in this new instance, as on many former occasions, confess herself vanquished or forestalled by the simple practical discovery, that a body of ice may be easily conveyed from one side of the globe to the other, crossing the line twice, with a very moderate loss from liquefaction.

We are indebted to Mr. J. J. Dixwell, the agent of the proprietors, for the following interesting particulars relative to the Tuscany's novel cargo, and the mode of shipping ice from America for foreign consumption.

The supplying of ice to the West Indies and to the southern States of the Union, New Orleans, &c., has become within these few years an extensive branch of trade under the successful exertions of its originator, Frederick Gudar, Esq., of Boston, with whom S. Austen, Esq., and Mr. W. C. Rogers, are associated in the present speculation.

The ponds from which the Boston ice is cut, are situated within ten miles of the city; it is also procured from the Kennebec and Penobscot rivers, in the state of Maine where it is deposited in ice-houses on the banks and shipped from thence to the capital. A peculiar machine is used to cut it from the ponds in blocks of two feet square, and from one foot to eighteen inches thick, varying according to the intensity of the season. If the winter does not prove severe enough to freeze the water to a convenient thickness, the square slabs are laid again over the sheet ice, until consolidated and so recut. The ice is stored in ware-houses constructed for the purpose at Boston.

For shipping it to the West Indies, a voyage of ten or fifteen days, little precaution is used. The whole hold of the vessel is filled with it, having a lining of tan, about four inches thick, upon the bottom and sides of the hold; and the top lifts covered with a layer of hay. The hatches are then closed, and are not allowed to be opened till the ice is ready to be discharged. It is usually measured for shipping, and each cord reckoned at three tons; a cubic foot weighs 58½ lbs.

For the voyage to India, a much longer one

than had been hitherto attempted, some additional precautions were deemed necessary for the preservation of the ice. The ice hold was an insulated house, extending from the after part of the forward hatch to the forward part of the after hatch, about fifty feet in length. It was constructed as follows:—a floor of one-inch deal planks was first laid down upon the dunnage at the bottom of the vessel; over this was strewed a layer, one foot thick of tan; that is, the refuse bark from the tanners' pits, thoroughly dried, which is found to be a very good and cheap non-conductor: over this was laid another deal planking, and the four sides of the ice-hold were built up in exactly the same manner, insulated from the sides of the vessel. The pump, well, and main-mast, were boxed around in the same manner.

The cubes of the ice were then packed or built together so close as to leave no space between them, and to make the whole one solid mass. about 180 tons were thus stowed. On the top was pressed down closely a foot of hay, and the whole was shut up from access of air, with a deal planking one inch thick nailed upon the lower surface of the lower deck timhers; the space between the planks and deck being stuffed with tan.

On the surface of the ice, at two places, was introduced a kind of float, having a guage rod passing through a stuffing-box in the cover; the object of which was to denote the gradual decrease of the ice, as it melted and subsided bodily.

The ice was shipped on the 6th and 7th of May, 1833, and discharged in Calcutta on the 13th, 14th and 15th, and 16th of September, making the voyage in four months and seven days. The amount of wastage could not be exactly ascertained from the sinking of the ice-guage; because, on opening the chamber, it was found that the ice had melted between each block, and not from the exterior only, in the manner of one solid mass, as was anticipated. Calculating from the rods, and from the diminished draught of the ship, Mr. Dixwell estimated the loss on arrival at Diamond Harbor, to be fifty-five tons; six or eight tons more being lost during the passage up the river; and probably about twenty in landing. About one hundred tons, say three thousand maunds, were finally deposited in the ice-house on shore; a lower room in a house at Brightman's Ghaut—rapidly floored, and lined with planks for the occasion.

The sale has not, we believe, been so rapid as might have been expected, amounting to no more than ten maunds per diem, although Mr. Rogers has fixed the price at the low rate of four annas per seer, one half of the price estimated for the Hugil ice, which was calculated to be somewhat cheaper in proportion than saltpetre. The public requires to be habituated to it, and to be satisfied of the economy of its substitution for the long-established process of cooling. There may also be some doubts of the best mode of preserving so fleeting a commodity; but on this head we cannot but advise an imitation of the methods pursued on a large scale on board of the Tuscany. For the application of the ice to the purposes of cooling, ample directions have been given in the "Gleanings of Science," vol. iii. p. 120. A box or basket, or tin case, with several folds of blankets, or having a double case lined with paddy chaff, or any non-conducting substance, will preserve the ice until wanted; and for cooling water or wine, the most effectual method of all is to put a lump of the clear crystal into the liquid. The next best is to spread fragments upon the bottles laid horizontally, and have them wrapped in flannel for a couple of hours.

So effectual was the non-conducting power of the ice-house on board, that a thermometer placed on it did not differ perceptibly from one in the cabin. From the temperature of the water pumped out, and that of the air in the rim of the vessel, Mr. Dixwell ascertained that the temperature of the hold was not sensibly affected by the ice. Upon leaving the topic, and running rapidly into higher latitudes, it retained its heat for some time; but after being several weeks in high latitudes, and becoming cooled to the temperature of the external air and sea, it took more than ten days in the tropics before the hold was heated again to the tropical standard.

From the Genesee Farmer.

SMALL MATTERS.

These are the very things about which farmers in general are far too negligent. The great things are allowed to engross the whole time and care, while the important facts that every thing great is composed of parts, is wholly overlooked. If the parts are taken care of, the whole is safe; but a neglect of items frequently causes serious or total loss. It is the neglect of small matters in farming that makes such an annual reduction in the profits of the farm; and more agriculturists fail of securing competence in consequence of this fault than any other, or perhaps all others put together. A few kernels of chess, or a little smut in your seed wheat, are small matters of themselves, but the influence they exercise on the crop is generally a serious affair; yet too many deem their presence so small a matter, that an hour or two of fanning and liming is considered as time thrown away. A shingle from the roof of the barn is a small matter, so small that many farmers think it unworthy of notice; yet that shingle opens a place through which the rain falls on the wheat or the hay, and does sufficient damage in the mow to pay for a thousand shingles, and the expense of putting them on in the bargain. A rail fallen from the top of the fence, a board knocked off the gate, a hole made under the fence by the pigs, are also among the small matters, that too many farmers pass by as unworthy of notice. Yet when he gets up some fine morning, and finds his herds pasturing in his wheat, occasioning the loss of some half a dozen head—when he sees some unlucky stroller in the highway take advantage of the defect in his gate and demolish the remainder—and when he finds that his pigs have destroyed half an acre of potatoes, and made a feast of his garden vegetables, then he begins to think five minutes spent in preventing such accidents, springing from pure carelessness, would be better than a week spent in remedying or regretting them. The man who never pays attention to small matters, is precisely one of those who suffers most from unruly cattle and horses, who spends the most money in paying, and the most time in repairing, damages, and who will, unless he turns over a new leaf, most assuredly find that the whole cannot be greater than the parts, and that he is running on a rock which has been the ruin of thousands.

There are other small matters not so intimately connected perhaps with *success* in farming as those we have hinted above, yet which are equally, and perhaps more indispensable to the real *comfort* of the farmer. The mode of life which a man leads in his family—the manner in which the articles he provides for the use of his family are disposed of—the training and education of the children—and the taste he acquires and cultivates, may be numbered among these. Separately they are too generally considered of little consequence, yet united as their influence is, and must be, to be right in these things is very important.

The appearance of the farm dwelling, the skill shown in planning, and the taste in embellishing, are often ranked among the small matters of the farmer. Too many seem to imagine, that the farmer has no business with any thing but the plough and the hoe—that it is of no consequence whether his taste, and his moral and intellectual qualites are properly cultivated and trained, forgetting that in the farming population resides the government—that they in reality make and unmake governors and presidents—and that as they are well or ill-informed, so will their conduct be judicious or injurious.

Planting a tree for ornament or for use—a rose bush for its fragrance and its beauty—the lilac and the snowball for their agreeable appearance—the bed of strawberries for the gratification of the palate—the training the clematis or the bitter-sweet over the windows, to temper the light and refresh the mind by their vivid green and waving foliage, are all ranked among the small matters by many farmers, and the few minutes required to accomplish all this, is deemed by such time thrown away. On the contrary, we think these very things as of great consequence; every tree and shrub planted adds to the value of the farm, for there are few men so insensible to natural beauty as not to be willing, in purchasing a farm, to pay something extra for its gratification; and no idea of agricultural comfort can be formed, in which some, or all of these things, do not make part. Wealth is composed of parts of dollars—the longest life of seconds—happiness of single sensations—and the prosperity of the farmer very much depends on the strict observance of small matters. Dr. Franklin's advice was to take care of the pence, and the pounds, as a matter course, would take care of themselves.

G.

From the Genius of Liberty.

SILK CULTURE PROPOSED IN LOUDOUN.

At a meeting of sundry citizens of the county of Loudoun, assembled in pursuance of notice, in the Court House, on the 8th day of August, for the purpose of considering the means of introducing the culture of Silk in said county—on motion, Cuthbert Powell, Esq. was called to the Chair, and Thomas M. Colston appointed Secretary.

The object of the meeting was explained by H. B. Powell, Esq. in a brief and forcible manner, and further supported by some striking statements from the Hon. Chas. Fenton Mercer and S. B. T. Caldwell, Esq. illustrating the great facility of culture, and the large profits resulting therefrom. When on motion of H. B. Powell, Esq. and John Janney, Esq. the following resolutions were unanimously adopted.

1st. *Resolved*, as the sense of this meeting, That it is highly expedient and proper to aid and encourage the introduction and culture of silk within the county of Loudoun.

2d. *Resolved*, That as a means of accomplishing this object, the Board of Overseers of the Poor of Loudoun be, and they are hereby requested to take such steps as they may deem expedient, to establish a mulberry orchard, upon the poor-house farm of this county, upon such a scale as to them may seem advisable and necessary.

3d. *Resolved*, That the Chairman of this meeting do forward a copy of the proceedings hereof, to the President of the board of the overseers of poor, with a request that he will submit them to the consideration of that body.

4th. *Resolved*, That the respective editors of newspapers in the town of Leesburg, be requested to publish the above proceedings.

CUTHBERT POWELL, Chairman.
THOMAS M. COLSTON, Secretary.

[We rejoice to see, in the above resolutions, a movement on the plan which we have before recommended, and still consider one of the safest grounds on which to commence silk culture in Virginia. Each of our county and town poor-house establishments furnishes enough of land, labor, superintendence and capital, for this pupose. Let this most suitable direction be given (and in proper manner,) to their now wasted means, and poor houses might perhaps cease to be nuisances—expensive, not only of public money, but of the labor and morals of the most destitute class of society.]

From the Farmers' Magazine of 1812.

ON THE DIFFERENCE IN THE EFFECT OF DUNG UPON DIFFERENT SOILS—AND UPON THE SAME LAND BEFORE AND AFTER IT HAS BEEN LIMED.

[The following communication is from the aged and venerable farmer who has been sometimes honored, and not undeservedly, by the name of the "Father of Scottish Husbandry"—and it deserves attention, not only for the truth and value of the opinions it conveys, but for the novelty and rareness of their appearance. So far as we know, this is the only instance, before the first publication of the *Essay on Calcareous Manures*, (and this was not known until after that publication.) of its being maintained by any book, or writer, that natural poor soils cannot be profitably and durably enriched by dung alone, until after they have been limed. The deductions from Mr. Dawson's statements accord entirely with the opinions maintained in the work referred to, as to the effects of manure on poor soils.

The concise memoir of Dawson, which will follow, is from a later volume of the same work, (in 1815) published after his death.]

That dung produces much greater effect upon good than upon bad land, when in tillage, is generally known, though not so fully attended to as it ought to be; but the difference in its effects upon

different kinds of land, when in grass, though much more considerable, has been very little observed; notwithstanding it is obvious that the dung of animals has a great effect upon all pastures which consist of what are called the finer grasses; that it has scarcely any upon land that is covered with bent-grass, or fog; and that it is of more or less value upon pastures, as herbage of the former or latter description predominates.

As accidental circumstances directed my attention more particularly to these consequences, it may be of use to publish an account of them in your Magazine, so far as they have been ascertained by my own experience; since it may induce some of your readers to communicate other facts and observations illustrative of this important subject.

In the year 1754, having occasion to carry a quantity of very fine black loam from a head-ridge of old infield land, to give the surface-water a free passage, it was laid upon outfield benty grass land adjoining, of which it covered about a quarter of an acre fully one inch thick. No grass seeds were sown upon this new covering; yet white clover, and other fine grasses, sprung up and gradually increased upon it; and the bent, upon which the loam was laid, diminished so speedily, that very little of it remained in the third year thereafter.

A few years after this, having a considerable extent of outfield land in fallow, which I wished to lime previous to its being laid down to pasture, and finding that I could not obtain a sufficient quantity of lime for the whole in proper time, I was induced, from observing the effects of the fine loam upon the surface of similar soil, even when covered with bent, to try a small quantity of lime on the surface of a part of this fallow, instead of a larger quantity ploughed down in the usual manner. Accordingly, in the autumn, about twenty acres of it was well harrowed, and then about fourteen Winchester bushels only of unslacked lime was, after being slacked, carefully spread upon each English acre, and immediately well harrowed in. As many pieces of the lime, which had not been fully slacked at first, were gradually reduced to powder by the dews and moisture of the earth—to mix that with the soil, the land was again well harrowed in three or four days thereafter. This land was sown in the spring with oats, with white and red clover and rye-grass seeds, and well harrowed, without being ploughed again. The crop of oats was good; the plants of grass sufficiently numerous and healthy; and they formed a very fine pasture, which continued good until ploughed, and years after, for corn.

About twelve years afterwards, I took a lease of the hilly farm of Grubbet; many parts of which, though of an earthy mould tolerably deep, were too steep and elevated to be kept in tillage. As these had been much exhausted by cropping, and were full of couch-grass, to destroy that, and procure a cover of fine grass, I fallowed them, and laid on the same quantity of lime per acre,—then harrowed, and sowed oats and grass seeds in the spring; exactly as in the last mentioned experiment. The oats were a full crop, and the plants of grass abundant. Several of these fields have been now above thirty years in pasture, and are still producing white clover and other fine grasses; no bent or fog has yet appeared upon them. It deserves particular notice, that more than *treble* the quantity of lime was laid upon fields adjoining of a similar soil, but which, being fitter for occasional tillage, upon them the lime was ploughed in. These fields were also sown with oats and grass seeds. The latter throve well, and gave a fine pasture the first year; but afterwards, the bent spread so fast, that, in three years, there was more of it than of the finer grasses.

In all these instances, where the lime was only harrowed in, and not ploughed down, the land not only continued to produce the fine grasses, but the dung of the animals feeding upon them had the same effect in increasing the quantity and verdure of the grass, as it has upon rich, loamy, infield soils; of this, the parts of Grubbet hills, above alluded to, afford a full proof at this day. Whereas, wherever the lime was ploughed down, the parts of the soil at the surface, which were not sufficiently mixed with lime, though sown with clovers, became gradually covered with bent; and dung of the animals had little or no effect upon such benty parts. That animal dung has little or no beneficial effect upon such pastures, is obvious from this circumstance, that, in all hilly countries, there are great tracts of benty grass land, which have continued for centuries, though constantly pastured with sheep or cattle, without any visible improvement; the animal dung neither increasing the quantity, nor improving the quality of the pasture. But it is still more remarkable that dung has no permanent effect upon such soils, even when ploughed down, as appears from the following facts.

In the year 1756, about five acres of earthy outfield benty land, were folded with sod-dikes, and very well dunged, with the intention of ploughing it for oats; but upon determining, afterwards, to enclose about sixty acres to be continued in pasture, of which these five acres made a part, the intention of ploughing these folds was given up; and the dikes were thrown down in the spring, well harrowed, and sown with rye-grass. The effect of the dung upon that land was very considerable the first year, a great deal less so the second, very little the third, and was not visible afterwards. Seven years thereafter, it was ploughed for oats along with the rest of the field, when the effects of the dung were expected to be considerable; but the crop was no better upon the folded part, than upon the others; nor was it any better upon the sides of the sod-dykes, where the dung had been at first fully covered in by the earth of the sods.

Some years afterwards, about ten acres of benty outfield was fallowed, and intended to be limed; but, for particular reasons, no part of it was limed. One half of it, however, was dunged from the farm-yard. The whole field was sown with oats and ryegrass seeds. The crop of oats was much better upon the part that was dunged, as was also the ryegrass the first year; but the bent spread so fast upon both parts, that no ryegrass was left the fourth year, nor was there any greater verdure upon the part that was dunged than upon the other part. When the whole field was ploughed some years after, there was no visible difference in the crops between the two parts: the crop upon both was very bad.

But from the following facts it appears, that upon that sort of soil, when properly mixed with lime, the effects of dung are not only greater, but

much more permanent, whether under tillage or pasture. After laying at least fifty bushels of unslacked lime upon each English acre of the dry benty land of the farm of Frogden, I cropped it in what was then called the Norfolk rotation; viz. 1st year, Turnip; 2d, Barley or Oats; 3d, Grass; and, 4th, Oats or Wheat. It was expected that this mode of cropping would not exhaust the land; but I found, even in the second round, that the crops were so very much worse on the thin soils, that it was necessary to allow the land to continue some years in pasture to recover its fertility; and for that purpose, it was sown with equal quantities of red, white, and yellow clovers, with a small portion of rye-grass seeds. As the land had been twice fallowed, and carried three crops of turnips horse-hoed after liming, and had never been ploughed deep, the surface-soil was well mixed with lime; and accordingly, the clovers were not afterwards injured by the native bent. But as the land had been exhausted by cropping, sheep were folded upon it in nets the first summer. Their dung greatly increased the quantity and richness of the pasture; and though the effect was less the next year, it continued to be considerable, and the pasture seemed still improving after the third year. After being six years in grass, the land was ploughed up, and produced full crops. As the soil of the fields treated in this manner was in every respect similar to that of the five acres which were folded in 1756, and to the soil of the field of ten acres, half of which was dunged from the farm yard, as already mentioned, the very great superiority in the permanency of the effects of dung in the latter instance, over that in the two former, can only be imputed to the lime.

From the preceding statement, the following conclusions deserve the attention of agriculturists.

1st. That animal dung dropped upon coarse, benty pastures, produces little or no improvement upon them; and that, even when sheep or cattle are confined to a small space, as in the case of folding, their dung ceases to produce any beneficial effect, after a few years, whether the land is continued in pasture, or brought under the plough.

2d. That even when land of this description is well fallowed and dunged, but not limed, though the dung augments the produce of the subsequent crop of grain, and of grass also for two or three years, that thereafter, its effects are no longer discernible either upon the one or the other.

3d. That when this land is limed, if the lime is kept upon the surface of the soil, or well mixed with it, and then laid down to pasture, the finer grasses continue in possession of the soil, even in elevated and exposed situations, for a great many years, to the exclusion of bent and fog. In the case of Grubbet hills, it was observed, that more than thirty years have now elapsed. Besides this, the dung of the animals pastured upon such land, adds every year to the luxuriance, and improves the quality, of the pasture, and augments the productive powers of the soil when afterwards ploughed for grain;—thus producing, upon a benty outfield soil, effects similar to what are experienced when rich infield lands have been long in pasture, and which are thereby more and more enriched.

4th. That when a large quantity of lime is laid on such land, and ploughed down deep, the same effects will not be produced, whether in respect to the permanent fineness of the pasture, its gradual amelioration by the dung of the animals depastured on it, or its fertility when afterwards in tillage. On the contrary, unless the surface is fully mixed with lime, the coarse grasses will, in a few years, regain possession of the soil, and the dung thereafter deposited by cattle will not enrich the land for subsequent tillage.

Lastly, It also appears from what has been stated, that the four-shift husbandry is only proper for very rich land, or in situations where there is a full command of dung: That by far the greatest part of the land of this country, requires to be continued in grass two, three, four, or more years, according to its natural poverty: That the objection made to this, viz. that the coarse grasses in a few years usurp possession of the soil, must be owing to the surface soil not being sufficiently mixed with lime, the lime having been covered too deep by the plough.

There are other manures besides lime, which to a certain degree, produce similar effects, upon which some observations may be offered at a future opportunity.

I am, sir, yours, &c.

WILLIAM DAWSON.

Edinburgh, 2d March, 1812.

From the Farmers' Magazine of 1815.

MEMOIR OF WILLIAM DAWSON, ESQ. OF GRADEN.

Mr. Dawson, the subject of this Memoir, was born at Harperton, in Berwickshire, of which his farther was tenant, in February 1734. He was sent to England when about 16 years of age, for the purpose of acquiring a more correct knowledge of practical agriculture, than was at that time to be obtained in his native county, where modern improvements had not yet commenced. His first residence was with Mr. Ball, agent to the Duke of Leeds, near Sheffield, in Yorkshire, where he continued three or four years. During this period Mr. Dawson regularly took a share in all the operations of a farm, and acquired that expertness in every branch of labor which he found of so much advantage to him in instructing his servants, when he came to adopt the same management on his farms in Scotland. Among other improvements, it was here that he first witnessed the cultivation of turnips according to the best practices of those times. His leisure hours were occupied in extending his knowledge beyond the different parts of manual labor in which his time was principally employed, and particularly in acquiring a coonsiderable degree of skill in the construction of agricultural implements; in which, throughout the course of a long life, he made many useful improvements. From Mr. Ball's Mr. Dawson went into Essex, and resided some time on the estate of Lord Fitzwalter, where he gave his attention chiefly to the diffierent branches of grazing; and he afterwards travelled through several other counties of England, accurately examining the best courses of husbandry, and storing up for his own use whatever seemed likely to be introduced with advantage into his own country.

On his return to Harperton he immediately began, with the consent of his father, to make trial of such modes of cultivation as seemed adapted to the soil of that farm; in particular, he employed

clay-marl to a great extent, at a time when the use of that manure was scarcely known in that district; and 'instead of dropping the attempt, as 'Lord Minto seems to have done, he persevered for 'several years, till better access was opened up to 'lime, and till he found that, owing to the trouble 'and expense attending marl, he could manure a 'larger extent of ground yearly with lime, at a 'cheaper rate.'* But as the soil of Harperton was not adapted to turnips, he did not commence the culture of this root upon a large scale, till he entered to the farm of Frogden on his own account, in 1759.

The arable land of the farm of Frogden is chiefly of a sandy soil, and was at that time without fences, and otherwise in a very unproductive state, so that great exertions in enclosing, cleansing, draining, and manuring the land, were required for several years at the commencement of Mr. Dawson's lease. Here he employed lime to so great an extent, that the proprietor, afraid of the injurious effects which had been often experienced from severe cropping after lime, readily agreed with Mr. Dawson for a life-rent lease, at a small advance of rent, in addition to the original one of 19 or 21 years. It is not true, as has been alledged, that Mr. Dawson used so much lime, because the proprietor had obliged himself to pay its original cost. The whole expense was incurred by himself, though his exertions at that time were so extraordinary as to appear to all his neighbors little suited to the circumstances of a tenant. The lime was brought from a distance of almost twenty miles, at first in four-wheeled, wagons, drawn by four horses, but afterwards in two-horse carts, to which he always continued to give the preference over wagons.

Draining, which was then very little known in Roxburghshire, was executed by Mr. Dawson in a very effectual manner; and, when he was in want of stones, he had recourse to an expedient which he had seen adopted in Essex. With implements contrived for the purpose, the drains were made wide at the top, of the requisite depth, and very narrow at the bottom. He then filled them with broom, placing the bar stalks undermost, and compressing their bushy tops above, through which the earth can penetrate but a very little way. Some of them, says Dr. Douglas,† have lasted upwards of thirty years, without any appearance of failure.

But that for which the agriculture of Scotland is most eminently indebted to Mr. Dawson, is the culture of turnips. Before his time, this valuable root, the foundation of all good husbandry on dry soils, had been introduced by proprietors both in the east and west of Scotland; but it had made very little progress, and produced no improvement in the general state of agriculture, even in what were then considered the best cultivated counties. The farmers of those times, like the lower classes of the tenantry at present, had an insuperable aversion to every innovation on their established routine; and viewed the attempts of proprietors, without the least inclination to imitate them. But when Mr. Dawson, himself a rent-paying farmer, cultivated turnips upon an extensive scale, his practice began to be followed by some of his neighbors; and from his example, and by means of the workmen whom he trained, the present most approved mode of cultivating turnips gradually spread over all the south-eastern counties.

Mr. Dawson began the cultivation of turnips at his entry to Frogden farm; but is understood that they were raised in the broadcast manner till 1763, when he adopted the practice of drilling. The first drills were formed by laying two furrow-slices together, leaving a space untouched between each drill; and this firm ground was afterwards raised by a plough that followed; so that every drill or ridgelet consisted of four furrows laid together, instead of two, as at present. Mr. D. himself, when this mode was first tried, held the plough that formed the two-furrow ridgelets; and was followed by his best ploughman, who cleaved out the interval that was left between them. At this time, though two-horse ploughs were sometimes used, and always by Mr. Dawson, a driver was constantly employed to guide the horses; but in the afternoon of the very first day, a trial was made to dispense with the driver when forming the first ridgelets or feerings; and so evident were the advantages of the ploughman himself directing the horses, that very soon afterwards all the drivers were dimissed. Mr. James M'Dougal, now tenant in the parish of Dinton, in Tweeddale, was the first ploughman in Scotland, that ever drew a straight furrow with two horses without a driver, and was the first person whom Mr. Dawson employed to form the turnip drills in the way just mentioned. The breadth of the drills was at first 3 feet, but after the land was once thoroughly cleaned, so great a breadth was found unnecessary, and they were accordingly reduced to the present breadth of 30 or 27 inches. The extent of his turnip crop was usually about 100 acres yearly. At first they were consumed mostly by cattle, which were sold throughout the winter and spring, for many years chiefly in Edinburgh market. At this time very few cattle were fattened in Scotland after the grass season; and the profits of this and other branches of Mr. Dawson's management were accordingly considerable. Thus, the predictions of his ruin, which were freely hazarded by his neighbors, were soon succeeded by an irresistible conviction of the superiority of his system, and by the imitation of those practices which were at first very generally ridiculed. Sometime afier, however, Mr. Dawson being satisfied of the great benefit which the land received from the turnips being eaten on the ground by sheep, gave up the fattening of cattle; and his whole turnips, latterly, were allotted to sheep alone, with the exception of a small portion carried to his straw-yard cattle, to convert the straw into manure.

Mr. Dawson, for several years after his entry to Frogden, adopted what was called the Norfolk rotation, one-half of his arable land being under corn, and the other half under clover and turnips, in equal proportions. But he soon found that his soil was too weak for this constant tillage; and that it was necessary, in order to ensure abundant crops, that his clover division should be left in pasture for three years or more. This course he ever afterwards persevered in, and all his crops were accordingly most luxurient and productive.

The success which was the just reward of Mr. Dawson's judicious and spirited management, in-

* Douglas's Survey of Roxburghshire, p. 135.

† Survey of Roxburghshire, p. 131.

duced him to extend his concerns beyond the farm of Frogden; and he afterwards rented the contiguous farms of Morbattle Tofts and Grubbet, about three miles distant. On these farms, the former of which consists of low lying arable land, the latter chiefly of steep hills, better adapted for sheep pasture, Mr. Dawson repeated all his former operations; and the vast improvement effected on the hills of Grubbet, by means of lime, are still conspicuous among the pastures of that district, after th elapse of upwards of thirty years. Such parts of them as were too steep to be frequently brought under tillage, were limed on the surface, after being cleaned by fallow or turnips; and the lime was harrowed in with the grass seeds sown along with the first crop thereafter;—a mode of management by which a small quantity of lime was found to produce very beneficial effects in raising and maintaining the finer grasses, and which, in such situations, ought to be more generally adopted.

The consequence of this liberal and judicous expenditure was soon visible in the increase of his fortune, which enabled him to purchase and improve the estate of Graden, an extensive property adjoining to his farm of Frogden.

During the last twelve or fifteen years of his life, Mr. Dawson retired from the personal superintendence of his farms, which then devolved upon his two sons, the elder of whom still possesses the farms of Morbattle Tofts and Grubbet; and the younger remained at Frogden till Mr. Dawson's lease was purchased by the proprietor in 1812 for a life annuity of £800. He spent the last years of his life in Edinburgh, where he died, after a few hours illness, on the 29 January 1815, in the eighty-first year of his age. He had been occasionally slightly indisposed for a year or two before with the same disease (an ossification of the heart) which terminated in death; but the general state of his health was good; and he retained the full possession of his mental faculties till his last moment. He married the year preceding his entry to the farm of Frogden, and has left a numerous family in prosperous circumstances.

Mr. Dawson was exceedingly regular in his habits, and most correct and systematical in all his agricultural operations, which were not only well conducted, but always executed at the proper season. His plans were the result of an enlightened and sober calculation; and were persisted in, in spite of every difficulty and discouragement, til they were reduced to practice. Every one who knows the the obstacles that are thrown in the way of all innovations in agriculture, by the sneers of prejudice and the obstinacy of ignorance, and not unfrequently by the evil offices of jealousy and malevolence, must be aware, that none but men of very strong minds, and of unceasing activity, are able to surmount them. Such a man was Mr. Dawson; and to this single individual may be justly ascribed the merit of producing a most favorable change in the sentiments, in regard to the trial of new experiments, as well as in the practice, of the farmers of Scotland. The laboring classes were not less indebted to this eminent person for opening up a source of employment, which has given bread to the young and feeble in almost the only branches of labor of which they are capable in merely rural districts. Most of his servants continued with him for many years; and such as had benefited by his instructions and advice, were eagerly engaged to introduce their master's improvements in other places. His benevolence, which often sought for objects at a distance that were not personally known to him, was displayed not only in pecuniary donations, while the giver frequently remained unknown, but was strikingly evinced in the attention which he paid to the education of the children of his laborers, for whom he maintained teachers at his own expense. If fame were always the reward of great and useful talents, there are few men of any age or country that would live longer in the grateful rememblance of posterity than the subject of this memoir.

In concluding this hasty sketch of Mr. Dawson's life, and the improvements introduced by him, it is impossible not to contrast, with a feeling of grateful exultation, the present agricultural state of Scotland with what it was when he commenced his operations in Tiviotdale. Did our limits permit, it might perhaps be neither unmstructive nor inconsistent with the present subject, to carry the contrast and the inquiry to even more remote periods; to trace the fluctuations of that enterprising spirit which, on the extinction of the Border feuds, reappeared under a more benignant aspect, to enlighten and fertilize the country its wasteful ardor had so often disturbed. It would be curious, too, amidst those changes to observe what various veins of intellect the same excitation discloses in different individuals, and the mutual influence and relation between the useful and ornamental arts. But we cannot here enter upon such investigations. It is enough to notice, that the same remarkable district, the scene of so many bloody conflicts—which trained to war and tumult the turbulent heroes of Border story—the Douglasses, and Homes and Scotts—can boast, in our own times, a host of names more beneficiently illustrious. The houses of Home and Elliott have produced Lord Kames, Lord Heathfield, and Lord Minto. Of humbler origin, Leyden and Park, with all the indefatigable intrepidity of their ancestors, have persevered, and (unhappily for the world) have perished in the prosecution of far noble enterprises; and the parish of Ednam, which gave birth to the Poet of the Seasons, also produced the "father of Scottish husbandry"—William Dawson.

From the Cultivator.

FRUIT KEPT SOUND IN COTTON.

We have been informed, by a gentleman who has had practical proof of its success, of a new mode of keeping fruits fresh for the table, as grapes, plums, &c. a long time after they have been gathered. It is simply to alternate them in layers with cotton batting, in clean stone jars, and to place them in a chamber secure from frost. The discovery was accidental. A servant maid in the family of William Morey, of Union Village, Washington county, about to visit her friends, secured a quantity of plums in this way, to preserve them till her return. They were found to have kept in excellent condition, long after this fruit had disappeared in the garden. From the hint thus afforded, Mr. Morey, Mr. Holmes, and one or two neighbors, laid down grapes in this manner last fall, and they enjoyed the luxury of fresh, fine flavored fruit through the winter, until the early part of March.

ON THE HABITS OF THE HESSIAN FLY.

To the Editor of the Farmers' Register.

Cambridge, Eastern Shore, Md.,
August 8th, 1836.

By the late disastrous ravages of the "Hessian Fly" throughout the whole wheat-growing district of the United States, and the false notions entertained and circulated of the habits of this insect, giving astonishing currency to the most futile, yet strongly vouched remedies, for many years published, and yet publishing to the credulous community, lately in the "Baltimore American," formerly in the "American Farmer," and also in the "Farmer's Register," vol. I., p. 351, (in which latter, I am happy to see in a note appended. you dissent from the hypothesis to which I particularly allude,) I am led to offer a few remarks in opposition to the "prevalent and deleterious doctrine"—"the erroneous principles on which it is founded," and the consequently "erroneous prescription of the much-extolled specific."

An apology cannot be required for discussing one of the most interesting questions that is, or ever has been, before the agricultural community—"a preventive for the ravages of the Hessian Fly."

It is not that I am enabled to settle this mooted point of vital importance that I make this communication, but it is in the hope of *approximating* the *truth,* by the detection of error: and it is thus, "*instar omnibus,*" that man, with his finite capacity, must approach and investigate the mysterious modes and results of infinite wisdom. And for the small contribution I now offer to this point, if it meet your approbation, I ask the favor of a space of your "Farmer's Register," where zeal is sanctioned by example, and confidence promoted by liberality.

The author of the communication, lately in the "Baltimore American," signed "Maryland Agriculturist"—"others also to the same effect," remarks, "it," (the Hessian Fly,) "is either generated in the grain of wheat, similar to the bug which infests the pea: or, the insect, when in its winged state, deposites an egg on the surface of the grain, when in the ear; and thus, when the wheat is sown and begins to vegitate, the egg vivifies, and the destructive worm is formed."

He adopts the latter opinion, and makes it the basis of his *remedy.*

His reasons for the opinion are, 1st. "That the insect releases itself by bursting the blade that covers it, when the head is forming, and assumes its winged state, and deposites its egg on the wheat when filling and coming to perfection."

2nd. "That with the aid of a microscope, the egg is discernible in the form of a glutinous matter."

Hence he deduces the remedy which he earnestly recommends to the notice of the farmer, viz: "to pass the seed, through brine or pickle, washing it well, and then roll it in lime."

By what means he does not inform us, he has arrived at the conclusion of this alternative, for the parental selection of a nidus; nor why he rejects the possibility of some other part of the plant being the chosen spot.

Indeed, the hypothesis adopted by this gentleman, and for many years, by others, so ardently, and no doubt so honestly pressed upon the agricultural community, rests upon a concatenated string of errors in fact, "false principles" and "false conclusions," and will lead, if practiced, to infallible disappointment.

It is not a fact, "that this insect releases itself 'by bursting the blade that covers it, when the *head* is *forming*, and then assumes the winged state' from which the writer infers the deposite of its eggs, when the *grain* is *filling.*"

It is a fact, well known, I had supposed, to every wheat grower in the United States, who has noticed the habits of the Hessian Fly, that they have at least *two broods* in the year, the fall and the spring brood, and probably more; the *two* are well known, because of their effects upon a valuable crop; others are not generally known.

The first of the two is *deposited* (or, I will say, "*appears,*") as every one knows, on the young autumnal wheat, where it rests at the base of the blade, till the vegetable juices have nourished it, and the solar beams have matured it, which, in general, does not occur, at least in the climate of Maryland, until between the first and tenth of the following "*May,*" when they are seen, on the wing, over the wheat fields, though in a momentary period, perpetrating their appalling deeds of mischief, by that almost incredible multiplication and celerity of performance, which all the smaller and ephemeral insects are capable of. Their progression, then, from the egg to the "*larva,*" the "*chrysalid,*" and the parent, or winged state, is more or less rapid, as the weather is favorable.

I would ask those numerous and respectable *entomologists,* and *farmers,* who contend that the *grain* is the medium through which the parent transmits the *new progeny* into life, "what becomes of those whose destinies have fixed their first stage upon a period when the *grain* is *not formed?* sct. the "spring," or the "*May*" brood. Will they say that one brood adopts the *grain,* and another the *blade* for a nidus? This contrariety of habit in the same insect is seen no where. It would be repugnant to the "known laws of nature," to "analogy," and to the "character of *instinct,*" which is notoriously *immutable.* Will they unite with us in the apostrophe—"*Natura! quam te colimus inviti quoque.*"

From the difficulty of accommodating this "*May brood,*" then, it would seem to be deducible, as a matter of necessity, "as they must be accommodated, and *a priori*" in a similar manner as the *fall brood;* and there is then no *grain* accommodation for them, there being no *grain formed at that time;* and yet they continue their procreation, "that the numerous and respectable entomologists, and farmers, who advocate the deposite *on* or *in* the *grain,* are "*quoad hoc*" in error; and their remedy, *consequently* and *absolutely* erroneous, and wholly inefficacious.

It is certain that the deposite must be made upon a part of the plant already *substantial, visible* and *tangible* at the time, but the "*May*" deposite finds no grain in this condition; and the dogma, "that it *must* be *on* or *in* the grain, *must* be abandoned as wholly untenable; and some other part of the plant must be sought as the selected spot of the deposite. I will presently show that this part is the blade.

2nly. The writer says, "if I had any doubts on this subject, they would be removed by the fact, that with the aid of a microscope the egg is discernible in the form of a glutinous matter."

What egg? I would ask. He has not attempted to show or to make it probable that the egg of the Hessian Fly has ever been seen on the grain of wheat, or on any other grain. If it can be shown that the grain was *ever* its resort, then it will be conceded, that it *always was* and *always will* be its resort; if the blade, the same: *reason* may be variable, but *instinct* never changes—the "*curculio*" will take his *fruit*, the "*aphis*" his *leaf*—they will perish rather than violate the laws of their nature, their physical and innate character. The eggs seen may have been the eggs of other insects. I have for some years observed a small, gaunt blue fly, very similar to the house fly, but much smaller, operating upon the head of wheat when nearly ripe, and apparently depositing eggs. I have found upon these heads, afterwards examined, and within the capsule, small larvæ which had consumed a portion of the grain. These are, possibly, from the fly the northern States are complaining of; and the eggs the gentleman has seen on the grain, may have proceeded from the same source. They have never appeared here in sufficient numbers to excite alarm, and they certainly are not the product of the Hessian fly. Having already shown that the head, or grain of the wheat cannot possibly be the place of deposite for the Hessian fly, I will proceed to verify my promise in a manner which I hope will be satisfactory to make it conclusively certain, that the blade of the plant is the place of deposite for the egg. I shall annex the authority, because thereby a responsibility is offered; and consequently, an additional sanction given to the verity of the facts. This is the more necessary, because of the importance of all facts, regarding this important subject matter; and especially such as may preserve the farmer from a fallacious confidence in a proposed remedy, which must inevitably disappoint his hopes, lull him into false security, and possibly suspend his further enquiries into a subject, whose vital importance requires incessant and united prosecution.

On the seventh day of "*May*" last, (a warm day, so noted on my agricultural diary,) I observed in an outer corner of one of my wheat fields, a cloud of insects, on the wing, swarming like bees, over a space of a few acres of the young wheat. Attracted by their dense and glittering appearance, increased, no doubt, by the bright solar rays reflected from them, I rode up to the swarm, whose elevation reached from the ground to about fifteen feet. I caught several, and found them to be the Hessian fly. On that day week, (also a warm and bright day, the intervening days had been generally, cool,) I took a microscope to the field, and pulling up several bunches of the wheat within the sphere of their flight, I discovered on many of the blades of *every* bunch, and on their upper surface, and a few inches from their insertion into the stem, agglutinated eggs, and larvæ invisible to the naked eye until the point was indicated by the instrument, when they might be seen in different stages of forwardness or progression to maturity: some *white*, in which no insect could be discerned upon breaking them—some *yellow*, in which insects were found—and others, from which they were recently released, and lying at the mouth of the shell, yet motionless, apparently, and with their heads turned downwards, as if to make their way as soon as they could move to the base of the blade, at which, finally, the too visible fattened, and grown larva, and chrysalid, give woful evidences of the source of their life and nutrition, and of the decline and death of the great object of our care and attention.

Having made these observations, I extended my researches through the apparent sphere of their operations, and found it equally infested: these few acres became entirely naked; and it is remarkable that no other part of the field afforded any vestige, *then* or *afterwards*, of the fly. Upon the remainder, I grew a heavy crop of straw—the grain was destroyed by the general, and subsequently disastrous scab. Many of the chrysalids I have brought to maturity, leaving no doubt of the identity of parent and offspring.

From the whole premises—"from facts"—"from reason"—from "analogy" it is clear, that the leaf of the plant, and not the head or grain is the *fit* and *actual* nidus of the Hessian fly—it is *there* that it is deposited, hatched and matured: and probably in several successive generations from the first suitable stage of the autumnal wheat, until, by its growth it is rendered too coarse for the functions of the tender offspring, when, no doubt, they renew their deposites, perhaps sparsely, on other tender plants, their next preferences, till their favorite growth of the coming autumn, shall complete the cycle.

The general character of the instinctive faculty, in other insects, better known, for the preservation of their broods, under the influence of which, they seek a nidus, in or near which, their progeny, when hatched, may be nourished—the fact, never I believe denied, that the larva of this fly has always been found at or near the base of the *leaf*, and never *on* or *in* the *grain*, or the *head*—the fact, that the grain or head does not exist at the time of the "*May*" deposite—the fact, that the larva of this fly does not consume any part of the grain or head, nor leave any trace of even a transcient existence in that portion of the plant—the fact, that if the egg were deposited there, the grain, when thrashed, undergoing its necessary heat, would, "as with the moth" or wheat weevil, vivify its *incumbent*, occupying so delicate a shell, which is alledged by these theorists to be afterwards brought to life by a *less degree* of *heat*, in the earth, after the cool season of seed time—the fact, that if deposited and hatched *on* or *in* the grain, it must in its tender larva stage feed *there* or perish, and the fact, that it does not feed *there* and does not perish; all these facts undeniable, together with those stated, as coming under my late observation, can leave no reasonable doubt, that the place of deposite for the egg of the Hessian fly, is the *leaf*—and *not* the *grain* or *head*, and demonstrate the absolute futility of the brining and liming remedy, so confidently and earnestly relied on, and recommended for many years; and to the present moment reiterated with ejaculations of surprise, "that so simple and infallible a remedy, (see Farmers' Register, vol. I.,) should not be generally circulated and adopted for the good of mankind."

Finally, I may remark, that I used this process of brining and liming for three years, not for the "fly," but for the smut (*le charbon*) a stinking, contagious pest, very different from the black head, (*la nielle*,) which latter is, with us, generally and improperly called smut: of the former, we have had but little; yet, for a few years, by some

unknown cause, it was introduced among my wheat. I found this remedy unavailing also for this disease; and my crops were not relieved until I purchased a new stock of seed wheat and scoured my granaries. In one of these years, it happened, that my crops, thus treated, suffered as much, perhaps more, than in any previous season: and from these experiments, (which were fully and faithfully executed, and on a large scale, because I entertained sanguine hopes of success,) I am under the fullest conviction, that the germinative principle is enfeebled by the process, and the plant rendered thereby an easier prey to the fly, or any other invading insect.*

I have, my dear sir, far exceeded the limits of my design in this communication; but really, the question of a remedy for the Hessian fly is so interesting—the detection of a prevalent error in respect to it so essential to its true solution—the chief remedy offered is so confidently pressed upon the public, and so palpably worse than nothing, inasmuch as it holds out false views, and obscures the path of research, coming too under the sanction of many and highly respectable sources, from New York to Virginia, inclusive—these considerations make my apology for the zeal which I have evinced, and the freedom which has been taken, by

Yours respectfully,

JOSEPH E. MUSE.

ON THE RAIL-ROADS OF NORTH CAROLINA, AND THE SOUTH GENERALLY.

To the Editor of the Farmers' Register.

To the fact of my not having, until nearly half August had expired, seen the reply of P. Q., [in No. 3, vol. 4, of the Farmers' Register,] must be attributed my silence on the subject. I really did not intend to be harsh or unpleasant. The paper was written *currente calamo*, and perhaps, rather severely expressed; if so, it was owing to my having been charged, *in imagination*, with "dealing damnation" around me, when as to the Wilmington, &c. road, *in reality* P. Q. was in a similar manner, doing the very same. The paper alluded to was sent to Wilmington with a view, I candidly confess, of counteracting his malediction. Whether it appeared or no, I am ignorant. The Rip-van-Winkle presses are strangely conducted, and, as well as the good citizens of Wilmington, *fearfully* inspired. They will understand, if they see this.

I plead guilty to the charge in his 3d paragraph; and, considering the actual condition of the south, and the attempts of Baltimore, &c., &c., to convey the produce, and carry on the commerce of the west, to the Patapsco, the Delaware, the Hudson, and last, but not least, the St. Lawrence, still think the "prejudice" with which I am charged justifiable, and rather a subject of congratulation than of condemnation—certainly *now* in Virginia, *eventually*, with Rip himself.

We agree as to the "vast chain of public works;" and I repeat it, I still rejoice in the success of the Gaston Rail Road—for, such I presume, is the result, but I will candidly confess I have not yet learned the road is in progress, which, *possibly* would have been the case, if the subscription had been completed. I am necessarily ignorant of what is going on, in either North Carolina or Georgia, as it most especially suits the Charleston—in *fact*, the only presses of South Carolina—to keep all that those states do, or attempt to do, perfectly out of sight—always excepting when it affects the interest of the "Emporium of the South" that *is to be*

P. Q. asks me, if "ever *my* pen can stop the march of the work," the great rail road to the south? In reply, I would ask him when and whether the road is to be continued to Fayette, &c., &c.; and if continued, is it likely to be as soon in operation, as the road from the Tennessee line, &c., to Baltimore. In this state of things, I cannot argue the matter; but notwithstanding *his* argument is so plausible, I *still* believe, that a "line from Darlington, &c., would make travellers forget that Raleigh was in existence." P. Q. "*supposes*" the Raleigh route extended south, and then asks my opinion as to the comparative merits of the two routes. I reply, that the Weldon, Halifax, and Waynesborough, is yet my favorite route. The road through Raleigh, Fayetteville, Cheraw, Camden, Columbia and Augusta, cannot be made at any thing like so cheap a rate, or accommodate any thing like so wealthy and wanting a country, as that pointed out by Col. Long. The one will suit pedlers, the other planters. Except on the river banks, in this *Carolina deserta* route, there is no valuable cultivation. Above and below it, there is very much. P. Q. speaks of "the frequently disagreeable and sometimes dangerous passage across the Chesapeake." This will vanish when the road is made, down the Eastern Shore, to the point opposite Norfolk. It will give an agreeable variety, and make Philadelphia, &c. &c., as accessible as Richmond or Wilmington. It is to the former the multitude *will* direct their steps.

I have not your Register by me, and with a frail memory am unable to get at the point of P. Q.'s last paragraph. It should seem my object was general. It was written under a strong feeling that something should be done, and "done quickly." The north has capital, can command nerve, and possesses energy. Louisville is uniting with Baltimore, and N. Orleans with Louisville; and, if the Planet, with her wrought iron rimmed wheels, is to carry a load of 333,000 lbs., I have no hesitation in saying, that the cotton of Tennessee, and upper Alabama *certainly*, and that of Louisiana *possibly*, is destined, ere long, to find its way to Baltimore, Philadelphia, &c.—indeed, already have 100 bales, in one parcel, found their way to the latter place, by way of the Schuylkill canal. And, if, as in the case of flour, &c., John Bull will receive the cotton of the west as *Colonial*, receiving *vice* the duties, the advantage of the ex-

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* From our experience of brining and liming seed wheat, to prevent the smut, we have arrived at a different opinion from Dr. Muse—as we have never known that disease to occur after the preventive process had been "fully and faithfully executed." Still we admit that such negative proofs, are not conclusive, as possibly some other unknown causes may have checked or prevented the disease. In another opinion expressed above, we are much disposed to concur—that is, that the process of brining and liming, (at least as usually, and perhaps carelessly, executed,) serves to weaken the germinating power of the seed, and thereby enfeebles the plants. ED. FAR. REG.

clusive carriage, much of it will reach Liverpool, *via* the St. Lawrence.

If "*there's on earth the man I hate*," it is a demagogue. It is one of that "*malignum oulgus*," whom I abhor. Hence, I must only state my regret that P. Q. should have so *expressed himself* as to make him think my *expression* tended to support such a mockery of patriotism and common sense. He seems to believe he had "sufficiently guarded himself"—perhaps he did—if so, and indeed in any case, I can only plead guilty and claim his excuse. Of monopolies and joint stock companies I have a horror, so perfect as to be prevented speaking of them with patience; but, sustained as they are by wealth and influence, and cramped as is the press by that wealth and influence, it is in vain *now* to say a word. However, I apprehend the subject will be given its real importance and a fair hearing at the next New York Legislature, when the bank-restraining act will come into discussion, and its principle combated by the report of the practical benefits to be derived from the only true joint stock system, as successfully adopted and used in England since 1825.

That with Col. Long's Report before it, and an overflowing treasury, some measure founded on the report was not proposed in Congress, surprised me. The result of a rail road made on the route and in the manner he proposed, would have saved hundreds and thousands of dollars, and hundreds of lives in the late Creek business. I should like no better witness than General Scott on this subject. * * * * A rail road from north-east to south-west, would convey the United States mail troops, &c., &c., free of charge—a consideration fully entitling its proprietors to a fair claim to a construction of two-fiths of it by the government: thus adding to the convenience of the government, and in such a manner and extent, as to give it no pretence for interfering with its management, or expecting to participate in its profits—moreover lessening its influence.

G. L. C.

[We regret that, in addition to the delay of the foregoing piece caused by the reasons stated by its author, at its commencement, it should have been still longer kept back, by want of room in the last No.—the pages of which were either then filled, or engaged by other matter, when this communication was received. By such long intervals occurring between different pieces of the same series, whether by the same writer, or by opposing controversialists, much of the interest is necessarily lost. To lessen this effect as much as possible we shall commence in the present case a course which will be continued hereafter, whenever circumstances require and permit it to be adopted—viz. to send a sheet containing any matter of controversy, as soon as printed, to both parties—and thus to afford earlier opportunity for reply.

We have before stated our desire to receive communications of the class to which these (on both sides) belong—that is, statements and arguments in explanation or support of any of the schemes of great and valuable public works for facilitating transportation. But at the same time we must remind our correspondents of the necessity of confining themselves to the discussion of the subjects undertaken—as well as of choosing subjects of sufficient importance to interest a considerable portion of our readers. The conflicting claims of both the great lines of railways advocated respectively by P. Q. and G. L. C. are certainly of high importauce: and if our correspondents choose to continue the discussion, we recommend to them to commence a new series, in which they may set forth fully their views on the general subjects, and avoid, as either unnecessary or improper, all minor or irrelevant, and especially all personal matters. For the purpose of having a full exposition of the subject, and rendering justice to both sides, we shall give in the following pages the views of the proposed Wilmington and Halifax railway and its general route, as presented in the Engineer's Report, just published.]

From the Richmond Whig.

COPPER IN VIRGINIA.

The copper region of our state is beginning to excite a great deal of interest throughout the country, and it is a subject well worthy the attention of scientific and practical men. The importance of this subject will readily be perceived, when we recollect that the demand for copper is almost unlimited, and constantly increasing, arising from the new uses to which it is almost daily being applied, and that copper mines are among the most certain and profitable of all mines. The last annual report of the consolidated mines in Cornwall, states the value of the products of that mine, for the last year, to be (£152,000) one hundred and fifty-two thousand pounds sterling: they employ three thousand five hundred laborers, and steam power equivalent to seven or eight thousand horses, and are now working at the depth of more than 1600 feet below the surface. The average yield of the ore from that mine is between 8 and 9 per cent of copper. The analysis of the copper ores of this state show them to be much richer, and lying nearer the surface, they can certainly be worked to much greater profit. There are two copper mines in this state, one called the United States, situated in Orange county, and the other the Phœnix Mine in the county of Fauquier, which are attracting considerable notice. There has as yet been but little work done at the United States, but a company has been recently organized and will speedily commence operations, under what are believed to be very favorable auspices. The Phœnix Mine was worked to considerable extent, many years since, by an English company and a large quantity of ore taken from the mine, and shipped to Europe. That company were forced to abandon the enterprise owing to the impossibility of keeping under the water with the imperfect machinery of that early day. A party of gentlemen have recently undertaken to work this mine. An engine has been erected to free the mine of water, which it easily accomplishes: skilful miners have been employed, and it is hoped the work will be prosecuted with vigor. The ore taken from the mine since the present company have commenced operations, is very rich and beautiful, and the prospects on the whole are very flattering. They have unwatered the mine, and ascertained that the vein is of regular formation and sufficiently large.

We have seen in this city specimens of the ore

of the Phœnix Mine, and they are of extreme wealth undoubtedly. They are now undergoing analysis by Dr. Johnson, and we may state the result at an early day.

The early history of the Phœnix Mine is curious. It was worked some 15 or 20 years before the Revolution, and the ore sent to England to be smelted. Its richness may be conjectured from its bearing transportation across the Atlantic, and still paying profit.

There is, we are happy to say, a deep interest beginning to be taken in the mineral wealth of Virginia, and a spirit of active enterprise displayed in developing it. For the gratification of the curious, and in the hope of impelling forward the spirit now awakened, we throw together the following *data* as indicating the value of the Phœnix copper mine. They have been prepared on careful inquiry, and we believe may be received with confidence.

1. It is proved that there is a regular well defined vein, the absence of which, it is believed, has prevented the success of any copper mine yet undertaken in America.

2. This vein is from two to five feet in width, which in Cornwall would be considered very considerable.

3. The vein cuts the formation at a high angle, and when that is the case, it never gives out in depth.

4. No reliance can be placed upon any mine, however favorable the superficial indications, when the existence of a regular vein cannot be demonstrated.

5. The vein is not only free from any admixture which might injure the copper, or render its reduction difficult, but actually contains an abundant quantity of limestone, the substance employed for its flux.

6. The ore is exceedingly kindly and rich, and will bear comparison with specimens from the famous mines of Cuba and Chili.

7. Considerable quantities of ore have been taken from the mines and shipped to Europe, as is proved by the refuse left on the surface, and the testimony of numerous traditions.

8. In England, few copper mines are productive for the first few hundred feet, whereas this one has yielded much fine ore about that of fifty.

9. The present formation, which is intersected by the vein, is superficial. This is the opinion, expressed with great confidence, of Professor Rogers, who states that the copper has come from beneath where the regular mineral formation will be found after penetrating through the upper horizontal strata.

10. The vein is probably of desirable length, as specimens of ore have been found upon its course at a considerable distance in both directions.

11. The property includes nearly a mile upon the supposed course of the vein.

12. The existence of a branch at the depth of fifty feet makes it probable that there are other veins—parallel veins. It is rare that a single isolated vein is found.

13. The mine is but 25 miles from tide water, and four from a canal now in process of construction.

14. There are roads and settlements, and above all, abundance of wood in the neighborhood.

15. The mine is in actual operation—a steam engine and ample mining materials are upon the spot, and an opportunity will soon be furnished of obtaining any additional machinery of the most improved kind in the immediate neighborhood.

From the Genesee Farmer.

STACKING HAY.

The plan of stacking hay is one which is not to be commended in itself, and which should be avoided by every farmer as much as is possible with the other arrangements of the farm. The reasons which to us are conclusive against stacking where it can be avoided are these: The outside of the stacks, forming no inconsiderable part of the whole, by exposure to the weather becomes utterly worthless as fodder—in feeding it out, much of the hay is blown away, or trodden down by the stock, and is thus lost, that would be saved were it fed from the rack or in the yard—the manure is not at the command of the farmer, and of course cannot be applied to those parts of the farm that most require it, and to those crops that would be the most benefited; and when the stacks are made in the meadow, as they most generally are, the turf all around them is poached up by the feet of the cattle, and the surface rendered uneven and unfit for mowing. Besides, hay fed out at the stack will not go near as far as when fed in stables or warm yards, nor will the stock receive the same benefit.

Still, stacking hay to a considerable extent *must* be practiced for the want of barn room, and where it is thus necessary, the best means of doing it should be adopted. If it is intended that the hay shall be sold, the larger the stack is constructed the better, as the surface exposed is always less in proportion to the size. If it is intended to be fed out where stacked, smaller stacks will be preferable, as the loss from injury by the weather will be more than compensated by the greater distribution of the manure, and the less permanent poaching of the ground. The better way of making these ordinary sized stacks, is to lay up a square pen of sound rails to the height of six feet; on the bottom tier of rails let others be laid across at little distances to serve as a flooring for the stack; let the top rails be well secured at the corners by notching or otherwise; a pole of suitable height, if desired, planted firmly in the centre, and the pen is fit for use. If the stack is well laid up, it will project over the rails all around, to the distance of two or three feet, thus entirely screening the lower and more solid part of the stack from the influence of the weather, and is at the same time completely fenced against cattle and sheep. Such a stack may easily be made to secure three tons of hay, which is as much as can be beneficially fed out at one place, to an ordinary stock. After a stack is laid up the requisite height, and topped off, great care should be used in throughly smoothing and raking the surface downwards, so as to prevent the action of rain and weather in the best manner. We have seen stacks so constructed, that the rain was thrown off with almost as much certainty as from a shingle roof; and others, the outside of which was so arranged as to invite the moisture to enter, instead of warding it off. In stacking hay, English farmers generally show more skill than

American ones. This skill and care, derived from custom and experience, it would be well for us to imitate.

G.

From the Silk Culturist.

AGRICULTURAL JURISPRUDENCE.

In the case of Greenleaf *vs.* Francis lately tried and decided by the Supreme Judicial Court of Massachusetts, a question of agricultural jurisprudence was presented and settled, which ought to be known to every farmer. The defendant sunk a new well in his own land, but so near the land of the plaintiff as to draw away the water from his, the plaintiff's well, for which the action was brought. It appeared in evidence, that the plaintiff's well had been supplied by a natural subterranean current, or spring in the defendant's land, and that by digging the new well, the defendant had diverted it from its former course. The court decided the defendant had a right to dig a well on his own premises, and if the plaintiff's well was injured thereby it was a damage without any injury.

From the Genesee Farmer.

DRINKS IN HARVEST.

One of the greatest triumphs of the temperance reform, and one, the beneficial influence of which is most felt by the farmer, has been achieved in the harvest field. Where spirits have been banished, we no longer see such shocking work made by the *sows and pigs*, (as a facetious farming friend, strongly attached to the sickle, persists in calling the cradle,) among the wheat, and the greater quantity of grain saved, and the superior neatness of the work done, should induce every farmer to exclude alcoholic drinks at once from his fields. We have seen the time, when about four o'clock some of the laborers might be seen snoring under the corners of the fences, or the shadow of a wheat rick, laid by, by the spirit of rum or whiskey; and those who continued their operations went whooping and hallowing through the field, throwing the grain about at such a fearful rate, that had Israelitish damsels been gleaning after them, wheat enough in a day might have been gathered, not only to have clothed the fair gatherers in fine linen, but purchased husbands to boot.

But in ridding ourselves of one evil, we must be careful not to run into another. Because we have become temperate in the use of spirits, that is no reason why we should become intemperate in the use of water; and there is reason to apprehend, from the frequent injuries sustained by drinking too much cold water in very warm weather, or when the body is overheated, that such is the fact. Men who labor hard, and sweat freely, must have the means of sustaining perspiration, or nature soon becomes exhausted; they must drink and drink freely, and it would be well if something could always be taken which would not only assuage the thirst, but afford permanent benefit. If some little pains, or a little expense, is necessary to accomplish this, the farmer will find himself, in the end, well rewarded. Good beers, of which hops and molasses are the active ingredients, are easily made, and make excellent drink. Milk and water is preferred by many, and combines in a good degree the above desired qualities; water to which a small quantity of oat meal has been added is used in Scotland to some extent, and its use has been introduced into this country; but perhaps the drink most profitable to all, the most effectual in quenching thirst and the least liable to produce injurious effects, is cold water made sufficiently sweet with molasses—maple is the best—a little ginger of good quality stirred in, and a little acid of some kind, lemon juice, or even common vinegar, added to suit the taste. This makes a pleasant and healthy drink, worthy of trial

G.

REPORT TO THE THIRD ANNUAL MEETING OF THE STOCKHOLDERS OF THE RICHMOND, FREDERICKSBURG AND POTOMAC RAIL ROAD COMPANY.

June 20, 1836.

In conformity to the act incorporating the stockholders of the Richmond, Fredericksburg and Potomac Rail Road Company, the President and Directors who were appointed on the 20th day of June, 1835, render the following account of their proceedings to the stockholders at their annual meeting, on the 20th of June, 1836.

In the last annual report of the stockholders, it was stated that a line of railway had been located between Richmond and the Mattaponi, superior even to the sanguine anticipations of the board, and the execution of which it was ascertained, would be effected at a considerable reduction from the first estimate of the engineer. The hope was expressed that the examinations then making between the Mattaponi and Fredericksburg would result in improvements equally important, in which case it was confidently anticipated that the whole expense of the work to Fredericksburg, including the cost of depots, warehouses, and water-stations, locomotive engines, cars and carriages, would not exceed an aggregate sum of $650,000 instead of $763,182 21 cents, the first estimate.

The hopes of the board as to a diminution of expense in the location of this last portion of the line were realized only in part, and since the last meeting of the stockholders, a great enhancement has taken place in the prices of labor and provisions in every portion of the country. This enhancement has been probably less felt in Virginia than elsewhere, but it has still existed to a sufficient extent to make it necessary to add to the contract prices of much of the work. From the above causes, the whole expenditure for a rail road and for moving power, whilst it will still be considerably within the first estimate of the engineer, will exceed what, at the last meeting of stockholders, it was hoped would cover it. As far as the board can now judge, the whole expenditure to Fredericksburg will not vary materially from an aggregate sum of $730,000.

On the 13th of February last, the road being then ready for transportation from Richmond as far as South Anna River, it was thought expedient to open it for use to that point. The whole of the first division, extending to the North Anna has been in use since the 15th of last month. Within

a few days past an additional portion has been completed, and passengers and produce are now conveyed on the road to Chesterfield in Caroline county, about half the distance to Fredericksburg. The board entertain no doubt that by the first of August the road will be opened to the depot near the Bowling Green, and confidently anticipate its entire completion to Fredericksburg in the course of November.

The advanced state of the work of course makes it necessary to call rapidly on the stockholders. Before the date of the last annual meeting only $25 a share had been required. Since then the board by a resolution of the 1st of September, called for $25 a share, payable in instalments of $5 each, on the 10th of each of the ensuing five months. On the 8th March, a further call was made of $10 a share, in two instalments, payable on the 15th of the two succeeding months. And by a late resolution of the 26th of May, the residue of the capital stock, being $40 on each share, has been required to be paid at the following times, to wit: $5 on the 20th of June, 15th of July, 10th of August, 1st of September, October, November, December and January. The punctuality of the stockholders, hitherto almost without exception, furnishes an assurance that the late call will be punctually met. As however it will be desirable that the amounts called for should be received even earlier than they have been asked, the board have determined to allow to stockholders who may anticipate their instalments, interest on the amounts advanced by them until the periods when the same would be payable.

Since the last annual meeting, the Board of Public Works has subscribed to the stock of this company for the amount authorized and required by the Act of Assembly, passed January 23d, 1835, and upon the terms and conditions specified in that act; and the Board has accepted the subscription so far as it was authorized to accept it. To obviate all dfficulty arising out of the circumstances of the subscriptions by the individuals exceeding three-fifths of the capital stock by forty-eight shares, an act of Assemby was passed on the 23d of March, 1836, declaring that the subscription by the Board of Public Works should be considered as a subscription for forty-eight shares less than two-fifths of the capital stock: that is to say, should be considered a subscription for 2752 shares, and relinquishing all claim of the Commonwealth to any greater number of the existing shares. By the terms of the act which authorized the subscription, the Commonwealth was not to be called on for more than $110,000, during the year 1835, nor more than $120,000 during the year 1836. Consequently, there will be a sum of $45,200 on account of the Commonwealth's subscription, which cannot be received until after the first of January next. As before that time the whole line to Fredericksburg will have been completed, and the whole capital wanted—the President and Directors think it probable that it will become expedient during the year to make a temporary loan. From the good standing and credit of the company, they entertain no doubt at present that any amount which may be required, could be obtained on a mere resolution of the board. But to guard against any difficulty in this respect, it might perhaps be advisable for the stockholders to authorize the board to make a loan, and give a lien on property, if found necessary or expedient, for the payment of the sum borrowed, and its interest.

An account of the disbursements of money, since the last annual meeting, has been made out according to the charter, and will accompany this report. The Treasurer has also been directed to prepare statements showing the amount of revenue received each month since any portion of the road has been in use, and the source whence derived, whether for stage passengers, local passengers or freight. Such statements, it was thought, the stockholders would probably desire to have printed along with this report for their use.

From these statements it will appear that from the first 26 miles of the road the receipts during the last month were about $3300. It is believed, that on the portion of the road now in use, being as before mentioned about one half, they may be moderately estimated for the remainder of the year at $4300 a month, or $51,600 per annum. Estimating the expenses of transportation and repairs at 50 per cent. of the gross receipts of the company, a proportion which the experience of the Petersburg and Roanoke Company shows to be abundantly sufficient, a nett profit will remain to the stockholders on their present business equal to an interest of between 7 and 8 per cent. on the cost of the first half of the road.

The anticipation at the last annual meeting that it would be in the power of the board, if deemed expedient, to declare a dividend to the stockholders in little more than twelve months from that time, may now be considered as realized. It has occurred to the board, that it would probably best suit those stockholders in this company who are also stockholders in the State Banks, to receive their dividends from this company at other periods than January and July. They contemplate declaring the first dividend on or before the 1st day of November next, and thereafter semi-annually.

The first dividend, though at the rate before mentioned on the cost of that portron of the road which shall have produced it, will be nominally small per share. It will however be not less than $2 on each share. Probably it will be more.

The board now feel that they hazard nothing in saying to the stockholders that their expectations of productiveness from the work, at the time it was embarked in, will be more than realized; that instead of a dividend of 8 or 9 per cent. a year on the cost of the road, at the expiration of the first twelve months from the period of its completion, one of 10 per cent. may be confidently reckoned on.

Gratifying as these results are, the prospects of the company are still more flattering. It was mentioned in the last annual report that a branch rail road had been projected from the neighborhood of Taylorsville to the south-west mountain. An act incorporating a company for the purpose of making the road, was passed at the last session of the legislature. The board entertaining the opinion that the construction of this road would add largely to both the trade and travel of the road committed to their charge, deemed it advisable to aid so far as they could in forwarding the object. Believing that nothing could be done better calculated to advance the measure than a declaration of the course which would be pursued

by this company in regard to the trade and travel passing from the one road upon the other, the board on the 20th of April last, came to a determination on this subject which has given general satisfaction to those who were inclined to embark as stockholders in the Louisa road. The board declared that upon being informed by the Louisa Company of the tolls charged upon the Louisa road, it would adopt their tolls as the tolls of this company for the transportation of persons, produce, merchandize and other goods received from or delivered upon the cars of the Louisa Company at the point of connection, and charge for the same only so much per mile as might be charged on the the Louisa road, with this proviso, however, that the rates fixed by the Louisa Company be such as to enable that company after the payment of all necessary expenses and setting apart a fair and reasonable sum for renewal and repairs as required by their charter, to divide at least six per centum per annum on the capital stock invested in it. Books have since been opened; more than enough to incorporate the company has been subscribed; the president and directors appointed, and other measures taken for going on with the work. The accomplishment of this work will bring upon the road committed to the board not only the travel between the West and Richmond, but the travel between the West and Fredericksburg, a large amount of local travel and an extensive trade in produce and return freights, all of which will be sources of profit to the stockholders in the two roads, and of benefit to the city of Richmond.

A company has been recently organized to make the railway between Richmond and Petersburg of which mention was made in the last annual report; the location of the road is now going on, and the work itself, it is understood, will be speedily commenced. The execution of this work may be expected to add largely to the amount of northern and southern travel upon the road under charge of the board.

In addition to these improvements, another, the Raleigh and Gaston Rail Road, not contemplated at the last meeting of the stockholders, but which, if more remote, will be not less advantageous in its influence on the improvement committed to the board, has been lately undertaken.

With these additional and important sources of profit, it may safely be presumed that the work committed to the board, will on the completion of the roads just mentioned, if not sooner, realize the maximum of fifteen per cent. allowed by the charter to the stockholders.

Viewed in this aspect, the right to increase the capital stock $300,000, with the privilege to the individual stockholders of taking the additional shares, imparts greater value to the stock now held by individuals. The company has power to extend the road, should it deem it advisable to do so, from its point of termination within the town of Fredericksburg, to the Potomac River or some creek thereof. Whilst it may be preferable in one point of view, to defer increasing the capital until the present stockholders, generally, can find it convenient to avail themselves of the privilege reserved to them, it will evidently be desirable to make the increase of capital soon enough to insure the completion of the road between the Rappahannock and Potomac by the time at which the improvements above named will probably be in operation. Before this road can be constructed, it will devolve on the board to cause two preliminary surveys to be made, one to Aquia Creek, or a point contiguous thereto, and the other to Potomac Creek, or a contiguous point. These and some other preliminary measures the board contemplate taking during the present year. Should the stockholders at the present meeting declare that they deem it advisable to extend the road to the Potomac, the board would probably deem it expedient prior to the next annual meeting, to increase the capital stock of the company to the extent authorized by the charter, as the whole amount will probably be required for the purpose of executing the portion of the road just mentioned, and for providing the increased number of locomotives, cars and carriages which would be required for its increased trade and travel.

Soon after the last annual meeting, an arrangement was made with the Bank of Pennsylvania, whereby facilities are afforded to persons residing in Philadelpha or its vicinity, for making transfers of stock in the mode suggested in the last report. The Philadelphia stockholders deposite their instalments in the same bank, and will there receive dividends on their stock whenever declared.

The president and directors cannot close their report without calling the attention of the stockholders to the necessity of a more efficient organization of the company. As one step towards it, the office of Treasurer and Clerk has been placed contiguous to the depot, and the late Treasurer, not being able, after this change of location, to continue in the office consistently with the duties of another station, and having in consequence resigned, Mr. Hilary Baker has been appointed in his stead. Another measure of more importance is deemed indispensable. Relieved, as the president, has been, in a great degree, by one of the directors, who has acted in the country, as an agent of the company, and by another director residing in Richmond, who has aided as far as he could in preparing business for the board, and attending to the finances of the company, the president has still found more of his time occupied by the duties of his office than he could conveniently devote to it, and has been desirous of resigning for some time past. He has deferred resigning thus long because it was thought preferable by the other members of the board, as well as by himself, that the appointment of his successor should be made by the stockholders in general meeting. The board cannot forbear to mention that while the duties properly devolving on the president have heretofore been very considerable, they are still on the increase, and upon the manner in which they shall be discharged, the prosperity of the company most essentially depends. Necessity therefore exists for adopting means similar to those taken by the Petersburg and Roanoke Company, to procure for the office of president an individual who will be able to give to the office all the time that will be necessary, and to discharge the duties of the station in such a manner as the interest of the company require.

All of which is respectfully submitted,

By direction of the Board.

JOHN A. LANCASTER,
President.

WILMINGTON AND HALIFAX RAILWAY.

Extracts from the Report of Walter Gwynn, Esq., Engineer, to the President and Directors of the Wilmington and Raleigh Rail Road Company.

GENTLEMEN:—I have the honor to submit the results of the reconnoissances and surveys, neccessary for the selection of the route of the contemplated rail road between Wilmington and Halifax.

A careful examination of the country led to the adopton of the following lines for survey:

Western Route.

This route commences at the "Dry Pond," in the south-east suburbs of Wilmington, thence running nearly due north to the head of market street, it takes an easterly direction to a favorable site for crossing Smith's Creek at "Love Grove." After crossing Smith's Creek, the route passes over a level plain, only broken by Prince George's Creek, which it crosses between Mr. Burgwin's dwelling and mill-house, to the north-east branch of the Cape Fear River, near the old bridge. The graduation on this portion of the route, consists of slight excavations and embankments in clean sand, and will be extremely easy of execution. From the Cape Fear, it may be run straight forty-seven miles to Hackleberry Pocosin, at the head of Bear Swamp. Within this distance, the route will cross Rockfish and Stewart Creeks. With the exception of the bridges and embankments across these streams, the surface of the ground is so very level, that the chief work in the road-way formation, will consist of slight cuts, no where greater than ten feet in depth, and embankments from two to three feet in height. The route traverses the ridge dividing the waters of Long Creek from those of the "north-east," and passes about two miles and a half to the west of South Washington; and about seven miles to the west of Kenansville. From the head of Bear Swamp, the country continues unbroken, until the route reaches Goshen; which is one of the head branches of the north-east. Here the first undulation in the plane of the road worthy of notice occurs, a descent and immediately an ascent of 30 feet to the mile is unavoidable, and some comparatively deep cutting, and heavy enbankments are encountered. Immediately on ascending from the valley of Goshen, the route reaches a dry, level, open woods through which it passes to Brook's Branch. The formation of the rail road on this portion of the route will consist, chiefly, in cutting down the large trees which overspread the track, and hewing and preparing them for the reception of the iron rails. After making a slight undulation in crossing Brooks' Branch, which is a very inconsiderable stream, it arrives at the same level, on which it continues to the head of Yellow Marsh; along the margin of which, it descends to the valley of the Neuse River, encountering in its descent, some heavy cuttings, which consist, however, entirely of sand. It crosses the Neuse at a very favorable place—just below the bridge on the stage road from Halifax to Fayetteville—thence passing near Waynesborough, the country wearing the same level aspect, with the exception of the breaks occasioned by the Nauhunta, Acock, and Black Creeks, the surface being almost perfectly smooth. It reaches Contentnea Creek about half way between Woodward's and Rountree's Bridges. After crossing the Contentnea, until the route reaches Enfield, the country may be characterized as bold, compared with the uniform level aspect heretofore presented.

The soil also undergoes some change. From sand, to a substratum of clay, mixed with sand, which will be encountered in some of the excavations. On this portion of the route, Tossnot, Town and Cokey Swamps, the Tar River, and Swift and Fishing Creeks, are crossed. These occasion a multiplicity of low summits, and an undulatory profile. The grades are, however, gentle, and the cuttings and fillings no where exceed fifteen feet. After leaving Enfield, the route gradually descends to a favorable site for crossing Beach Swamp, just below the mouth of Bear Swamp, along the borders of which, with very little variation from a level grade, and no other expense in the formation of the road-way, than the raising of a bank two or three feet in height, the route runs until it reaches Quaukey Creek. Here occurs the highest embankment on the line of the road. It is, however, very short. From Quaukey, which is only a mile from the termination of the road, the route ascends very gradually until it unites with the Halifax and Weldon Rail Road, about half a mile from Halifax, and seven miles from Weldon. At Weldon, the Portsmouth and Roanoke Rail Road crosses the Roanoke River by a bridge—it also crosses the Petersburg Rail Road about two and a half miles from Weldon, where the two roads can be easily united; and thus a connexion of your road may be formed with the Petersburg Rail Road, or by the steamboats which now daily ply between Weldon and Blakely, they may be connected. In any event I can see no difficulty in the way of both passengers and goods, destined for Petersburg, passing from your road to the Petersburg Rail Road, with as little delay and inconvenience, as to the Portsmouth Rail Road.

A description of the line which was run on the west side of Long Creek to Bear Swamp, and which will be brought into comparison with that portion of the western route, from Wilmington to the same point, will appropriately precede the estimats of the "western route," and will come in here. This line commences at the timber pens, and runs upwards along the margin of the river about a mile; thence it crosses over and passes along the dividing ground between the Cape Fear and its north-east branch, to nearly the head of Long Creek. The road-bed in this distance will be formed of alternate excavations and embankments, consisting entirely of sand. Thence the line will pass on the dividing ground between Long Creek and Moore's Creek; and between Moore's and Rockfish Creeks, and throughout to the head of Bear Swamp, the ground is extremely favorable. Stewart and Turkey Creeks are the only streams that are crossed.

Summary of the excavation, embankments, and superstructure:

69 miles, 1191 feet, at	$433,815 97

From this, there should be deducted the cost of six miles of superstructure, at $3,800 per mile, this being the reduction which will occur in the actual location; which leaves $411,015 97, the cost of this line. This compared with the first

three items in the following estimate of the western route, and the result in favor of the route on the east side of Long Creek to Bear Swamp, will be in the first cost, $49,593 09; and in distance upon the probable line of location, 4950 feet. A comparison of the grades and curvatures, results in favor of the line on the east side of Long Creek. I have, therefore, based my estimates for the western route on this line, supposing that the same reasons which have influenced me in the selection, may also operate with the board in according it the preference. I have now to proceed with the estimates of the

Western Route.

Summary of the cost of excavations, embankments, superstructure, Locomotive Engines, Coaches, Cars, Water Stations, Wharves, Shops, Contingencies and Steamboats:

161 miles—3189 feet of rail road, and 150 miles of steam boat communication, $1,500,000.

Careful and minute enquiries with the view of ascertaining the practicability of a route through Rockymount, and also through Kenansville, by Rockford, resulted in the conviction of their being less eligible than either of the routes selected. It now remains to describe the character of the

Eastern Route.

This route pursues the trace of the western route to station No. 176; thence it takes a more easterly direction, and traverses the ridge dividing the waters of the north-east branch of Cape Fear River from those of the New and Neuse Rivers, until it reaches the Neuse at Rockford. On this portion of the route, we cross Smith's and Prince George's Creeks, and several small streams, which make in the north-east. The general aspect of the country is extremely level and favorable to the contemplated work. From Rockford to Edward's Bridge, where the route crosses the Contentnea, there are no difficulties or streams to cross worthy of notice. From Contentnea the route ascends gradually to a level which is maintained for several miles; when it descends to effect a favorable crossing of Town Creek; thence several undulations are necessary in crossing small streams, until the route reaches Tarborough. Thence a level grade may be had entirely across Tar River. A favorable site for crossing which, is found about a mile and a half north of Tarborough. Thence the route alternately ascends and descends to lessen the excavations and embankments in passing Deep Creek, Connecanary Creek, and the ridges between them, until it enters the western route five miles from Halifax, which it pursues to the Halifax and Weldon Rail Road.

Summary of the cost of excavations embankments, superstructure, Locomotive Engines, Coaches, Cars, Water Stations, Wharves, Shops, Contingencies, and Steamboats.

162 miles—1504 feet of rail road, and 150 miles steamboat communication, $1,512,853 80—makng the whole line of communication, by rail road and steamboats, 312 miles.

This shows a difference in cost in favor of the western route of 12,853 80. A comparison of the grades, length of curvatures, and straight lines exhibits also a slight difference in favor of that route. On the eastern route, however, there will occur a thousand feet less bridging, this, in the annual repairs of the road will operate in its favor, by lessening the amount some four thousand dollars per annum. The superiority of the one line over the other, in a professional point of view, is so very slight that an expression of my preference under this head, could not be a decision of the question of choice between them. The board may, then, consider that I lay the routes before them as equal under all the aspects in which under my province I have been called upon to view them. Their familiarity with the resources and interests of the country bordering on the lines, will enable them to estimate and compare the amount of trade on each; a preponderance of which, may very justly form the basis of a preference. I would beg leave, however, to add, that looking to a connection with the works which are contemplated between the western parts of the state, and the sea-board, and to the lateral branches which are authorized by the charter, the western route is decidedly to be preferred. But whether the eastern or the western route be selected, I can confidently assure the board, that no portion of the United States, certainly for the great extent of country embraced, offers so many facilities for the construction of a rail road. Timber of the best quality is found on every part of the line; the soil consisting either wholly of sand, or a proper admixture of sand and clay, affords as good a foundation as can be expected from earth alone. Granite occurs on the Tar River, and on Fishing and Quauky Creeks; and will be used in forming the abutments of the bridges across these streams; and for the construction of drains within convenient hauling distance. Where rock is not convenient, wooden structures will be used in the passage of the water courses and ravines, to be substituted hereafter by stone or brick, which can be delivered much more economically after the completion of the road. The entire elevation of the road above tide water, is 189 feet. This is overcome by grades rarely so great as 30 feet to the mile. The whole length of curvatures on the road does not exceed thirteen miles; and in every instance, the departure from a straight line is effected on curves described with a radius exceeding a mile. So slight indeed are the grades and curvatures compared with many other roads in the country, that yours may be considered as straight and level; certainly as presenting every facility for the most extensive and economical application of swift locomotive power, to which rail roads owe their undenial superiority wherever, as will be the case here, gravity has but a small share in the resistance.

The estimate of the roadway formation, falls far beneath the average cost of similar works; while it is believed that the profits will not be excelled by any improvement in the country. For your rail road, in connexion with the Portsmouth and Roanoke, and the Petersburg Rail Road at Weldon; both of which are links in continuous lines of railway and steamboat communication to Boston, must become the great thoroughfare between the north and south; for between the Roanoke River and Charleston, or the Charleston and Hamburg Rail Road, admitting there were any other communication by railway contemplated, its

greater length, and what is a matter of deeper consideration, its greater expense, forbids the idea of rivalry; and places your road almost beyond the reach of competition. So that we may say, in fact, it forms an important, if not indeed, the most important link in the great line of intercommunication between the north and the south. Under this view of the subject, it is difficult, without the appearance of exaggeration, to estimate the probable revenue.

The travel between Charleston and the northern cities by steamboats and stages, may be safely computed at sixty thousand. This amount might be greatly swelled by embracing the whole travel from New Orleans; which we confidently believe will take the route of your rail road.

But we will say sixty thousand travellers at $12 50 each,	$750,000 00
To this we may add for the transportation of the mail,	50,000 00
Way passengers and freight on produce and goods,	100,000 00
	$900,000 00
Deduct for the repairs and renewal of the road and steamboats	$200,000 00
And it leaves a nett revenue of	$700,000 00

Now, although I believe this sum will fall short of the receipts for the first year, yet, lest we should appear too sanguine, and to remove all possible objection, we will deduct from the foregoing, twenty-five per cent. which reduces the amount to $525,000 00, or a dividend of thirty-five per cent. on the estimated cost of the work.

A rail road which produces six per cent. nett in the first year of its operation, is considered good property; for the increase of business which must ensue, always increases the annual profits in a great ratio.

While our estimates exceed this per centage nearly six times, it will be perceived that we have confined ourselves entirely to the amount of the present travel; and this after being taken at a very low estimate, reduced twenty-five per cent. But in presenting a view of the prospects of the road, we should anticipate the probable increase of travelling by reason of the increase of the business and population of Charleston; which must ensue from the great and gigantic scheme which she has in contemplation, and which she will no doubt carry into effect to Cincinnati. And in a few years the rail road to Hamburg, which is now being extended to Athens, will be prolonged southwardly to Columbus; and thence in continuation with the rail road to Pensacola, complete the line of railway and steamboats all the way to New Orleans. But without any further specification of the various improvements which are in contemplation and begun at the south, suffice it to say, that your southern termination at Charleston, towards which all these improvements converge, ensures you immediate, continually increasing and never failing sources of revenue; and completely sets all competition by other and similar improvements, at defiance. For all past experience has shown that the travel on routes connecting commercial cities, increases in a ratio, much beyond that of the business or population; and the great lines of travel in all countries lead through the commercial towns.

Routes passing through the interior, with a view to divert travel, must be regarded as experiments, running counter to all experience, and of very doubtful success. And I lay it down as an incontrovertible fact, that those works which will prove most profitable, and most conducive to the great and varied interests of the country, may be classified under two heads. Those which connect the commercial cities, and those which lead from the commercial towns by the most direct routes to the interior and western portions of our country.

But your revenue will be greatly swelled from other sources, which we have not taken into the account. All the improvements which are contemplated from the sea-board to the western part of your state, must cross the line of your railway; and to whatever point destined, will find it to their interest, to some extent, to pursue it, in order to make selection of the most favorable location. Under this aspect, your rail road presents itself to the state in a peculiarly interesting point of view. It traverses it nearly through its entire length from north to south, and forms the basis upon which the internal improvement scheme of the Raleigh Convention may be most economically carried out. For, as I have before intimated, the cheapest route from any point on the sea-board to the west, from Beaufort, for instance, to the narrows of the Yadkin, will be found on a very direct line west, until it falls into your rail road; and thence (in this case) along it to some point south of the Neuse River.

In a military point of view your rail road, in connexion with the Portsmouth and Roanoke Rail Road, and the contemplated rail road between Wilmington and Charleston, may be regarded as forming a complete line of defence to the whole sea-board from Norfolk to Charleston; for there is no rail road in the country, upon which so large a force can be concentrated in a given time; and where, perhaps, there would be a greater probability of its being required. By the Charleston and Hamburg Rail Road and its connexions; the Charleston and Cincinnati Rail Road; the Roanoke, Danville, and Junction Rail Road; the Portsmouth and Petersburg Rail Roads; and by means of the railways to the west within your own state, levies for troops on South Carolina, Georgia, Alabama, Louisiana, Mississippi, Tennessee, Kentucky, Illinois, Indianna, Ohio, Virginia, North Carolina, Maryland, &c., may be met from the remote states in a few days, and in a few hours, from the more adjacent states, and any number of troops, may be thrown on the line of your railway; whence, by lateral roads and steam boats, (down the numerous navigable streams which the road crosses) in a few hours, or by a march of a day or two, they may occupy any position on this extended coast. And in the transportation of stores and munitions of war, which, under the military head, is a matter of primary importance, it affords a safe avenue; and in time of war, will prove a saving of millions to the government.*

* *Extract from the Report of Mr. Cass, Secretary of War, on National defence.*

"The power of transporting troops and munitions of war, has already opened new views upon this subject; and such is the progress and probable extent of the new system of intercommunication, that the time will soon come, when almost any amount of physical force

As a national work, therefore, yours cannot be considered as secondary to none in the country. But one of the most happy results of the railway system in the southern country, and which will be imparted by your rail road, to that portion of the state most concerned, is the effect it will have, by the speedy concentration of troops to put down, if not entirely suppress and remove all apprehensions of servile disturbances and insurrections. The speedy transit of the mail, especially between commercial cities, is an object of solicitude with all governments. Your improvement fully meets this object, and its importance under this head also, cannot fail to attract the attention of the general government; and also the concentrated concurrent interests of the large cities at the north. And having the effect, as we have asserted, your road will have, to turn the whole stream of travel between the north and the south, through Charleston, and on the Charleston and Hamburg, and the Charleston and Cincinnati Rail Roads, she, as well as those interested in these two great improvements, are deeply interested in your success, and will no doubt contribute largely towards it; and the trade and travel which it will throw on the Portsmouth and Petersburg railways, will greatly enhance their profits, and advance the prosperity and wealth of Petersburg, Norfolk, and Portsmouth.

The counties along the line have manifested the interest with which they regard it, by the handsome subscriptions which they have made.

The benefits to Wilmington will be immediately felt in the great increase in the exchange of commodities, which the increased facilities of communicating with a rich back country will afford. And she may be justly proud of the rank to which she will elevate herself, in having projected and carried into effect, an improvement which may be characterized as a great national and state work.

All, which is respectfully submitted by,

Gentlemen,

Your obedient servant,

WALTER GWYNN,
Civil Engineer.

Wilmington, Aug. 15, 1836.

BEET ROOT SUGAR.

A remarkable proof of the facility with which beet-root sugar manufactories may be established, is presented at this moment at Wallers in the department du Nord.—Four of the villages, by advancing 50 fr. each, have formed a joint capital of 200 fr., and with this they produce between 40 and 50 lbs. of sugar, of rather inferior quality, a day. They employ currycombs to rasp the beet roots, which they put into a napkin press to extract the juice, and then boil the syrup in common culinary boilers.

We learn from Berlin that the manufacture of sugar from beet-root has become quite a mania in Prussia, and that the land-owners have given up the cultivation of potatoes for distillation, and planted all their fields with the new saccharine root.—[*English paper.*

From the Genesee Farmer.

THE PERSIMMON.

(Diospyros virginiana.)

The Persimmon tree perfectly matures its fruit in the Genesee Country, though we have not seen it growing indigenously further north than the banks of the Susquehanna near Catawissy. It is entirely hardy. The fruit is pleasant, "in form and bigness like a date, very firm like that fruit and almost as sweet," and we think it well worthy of the attention of those who have a taste for varieties.

This tree belongs to Polygamia Diœcia of the Linnæan system—the male flower growing on separate plants, while those which produce the fruit have hermaphrodite flrowers. Botanists have considered that the anthers of the latter were effete and useless. On examining both kinds of flowers however, we discover nothing to warrant the conclusion; and we were strengthened in our doubt by the circumstance of a large grove of these trees, all originating from one root, that were productive; while no male or barren tree was known to exist in the neighborhood. The case seemed to be nearly analogous to what often occurs in our wild grape, and in the strawberry; and we therefore made the following experiment: One persimmon tree had not failed to bear fruit for several years. At the distance of twenty feet from it on the west side, stood a tree which produced only staminate flowers, and another at twice the distance on the east side. In the year 1832, we cut down both the male trees just as the fertile flowers were beginning to open, and immediately removed them so that none of the pollen could reach those flowers. The consequence was, —*not a single persimmon was produced in four years.* Vigorous suckers from the stumps of those trees however sprung up; and this spring we observed that one of them had a few flowers: *The fertile tree is now once more set with fruit.*

From this experiment, which we made at our cost, both nurserymen and customers may learn the futility of planting out a single tree, far remote from all others, with the hope of its bearing fruit. We have seen a tree that was set out when no other was known to be within hundreds of miles. Neither the nurseryman nor the purchaser, knew to which *sex* it belonged, and it is doubtful if the proprietor knows at this day, for it has always been barren. Our advice to such as wish to cultivate the persimmon, is therefore to buy trees *in pairs*, and to buy them of those who are worthy of their confidence.

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may be thrown, in a few hours, upon any point threatened by an army. Nashville may succor New Orleans in sixty hours; Cincinnati may aid Charleston in about the same time; Pittsburgh will require but twenty-four hours to relieve Baltimore; and troops from that city, and from Boston, may leave each place in the morning, and meet in New York in the evening. This wonderful capacity for movement, increases in effect, some of the most important elements of national power. It neutralises one of the great advantages of an assailing force, choosing its point of attack, and possessing the necessary means of reaching it. Detachments liable, under former circumstances, to be cut off in detail, may now be concentrated without delay, and most of the garrisons upon the sea-board may be brought together, and after accomplishing the object of their concentration, be returned to their stations in time to repel any attack meditated against them."

THE LAW IN REGARD TO DIVIDING FENCES.

Judge Strong, in a recent case in our Common Pleas, has decided that no one has a right, when making a division fence, to run half of the same on the lot of the neighboring owner—but that it must be wholly on the land of him who makes it. The case which called forth this decision, was an action of trespass for cutting a ditch in a meadow land, for the purpose of a fence. It appears that the defendant in this case, cut some five feet wide on each side of the line, which constituted the boundary between him and the plaintiff; and the Judge in his charge enforced upon the jury, that by no existing statute was the making of a fence on the lot of an adjoining owner justified; but that those constructed half on one side and half on the other, must be constructed by mutual consent; otherwise legal measures could be instituted for damage, &c. The owners of real estate should recollect this decision, as cases in which it would be applicable, are not unfrequent in our courts of justice.—*Northampton Courier.*

From the Key West Enquirer.

FLORIDA ARROW ROOT.

The day, we trust, is not far distant when prejudices in favor of the productions of foreign countries will case to operate to the detriment of the agriculturists and manufacturers of our own. We are sufficiently friendly to the policy and principle of free trade, to allow every man to exercise the most perfect freedom in the purchase of whatever he may require, whether the necessaries or luxuries of life, at whatever price he may think proper, yet we cannot but lament the blindness or perverseness that lead any one to overlook an article of home manufacture supplied at comparatively a low price, for one of foreign production in no way superior and truly considered "a dear article." The arrow root which is the growth of South Florida, may be considered one of the home productions which are sacrificed to the undue preference for those imported. Equally white, equally pure with that of Jamaca, heretofore deemed the best, and by many thought to be the most nutritious of the two, there can be no reason for its not superseding the necessity of supplying market with any of the articles from abroad.

We have no price current at hand giving the value of the imported article in first hands, but we are well assured that it cannot be imported at less than from two or three times the price of that manufactured in this vicinity, which is from 6 to 8 cts. per lb. With an increase of demand, the aid of machinery would be required, and diminution in price might be anticipated; at present a similar mode of manufacture to that followed abroad is pursued in Florida, though it is probable the Florida manufacturers possess not all the facilities of their competitors.

We are not sufficiently versed in botany to pronounce upon the similarity of the Florida root to that of Jamaica or Bermuda, but there can be no doubt of their belonging to the same family of plants. The quantity manufactured is sufficient for the present demand, and doubtless will increase, as the root is indigenous, and but two or three planters being at present engaged in the manufacture, and that too, in connection with their other agricultural pursuits.

The low price at which the Florida arrow root is sold, allows of its being applied to other purposes than those to which, from its dearness, foreign arrow root was usually restricted. For instance, it is used here almost universally, in the place of starch, and no one can visit Key West without being positively satisfied of the fitness of the substitute. It is so extremely valuable in the composition of many nicities of the table (a fact which we have made known for the particular edification of our fair readers,) and particularly in an imitation *Best Mung*. It is used by the planters in some places as a bread stuff, and was so used by the aborigines, but do not ask it for so general a use as to have it supersede the use of either wheat or rye.

We shall rest satisfied if our notice secures for the manufacturers as great a demand as the goodness of their arrow root deserves.

From the Genesee Farmer.

THE CHINESE MULBERRY.

(Morus multicaulis.)

Last year our Chinese Mulberry produced fruit, and we have three plants growing from the seed. One is eighteen inches high, and all are in thriving condition. The leaves are as large as those which grow on layers or cuttings of the same size; and prove very satisfactorily to us, that the tale of such seeds producing the common white mulberry is all a fiction. The explanation doubtless is, that the true seeds were not obtained.

Whether these seedlings will be hardier than trees from cuttings, or not, we do not know; but hope they will be so; and on this account we shall value them higher than trees from cuttings of the old kind. Unfortunately, our tree was so much injured last winter, that no fruit was obtained from it this season.

From the Albany Argus.

THE GEOLOGICAL SURVEY OF THE STATE OF NEW YORK.

It will be generally recollected that the legislature at the last season, made provision for a geological survey of this state, including an account of its botanical and zoological productions. This important measure was to be executed under the direction of the governor, by competent persons to be appointed by him. The outlines of a plan for this work, together with a specification of the objects to be embraced in it, were submitted to the legislature in an able and excellent report, made to that body by Gen. Dix, as secretary of state. This plan has, with some inconsiderable alterations, been adopted by the governor. The state is divided into four districts, and one principal geologist and an assistant assigned to each, instead of two geologists, as suggested in the report made by Gen. Dix.

It was supposed that it would be necessary to have a draughtsman for each district, but it is believed that a change in this respect can be advantageously made. The geologist and his assistant will be able to execute all the ordinary drawings, and the services of only one draughtsman will be required to execute the more difficult parts of this

branch of the work. An accurate, minute and uniform analysis of the minerals, including mineral waters, and of the various soils of the state, has been deemed of great importance, and will be of evident utility. To ensure the best result in this respect, and to prevent the repetition of the same labor to some extent, at least, by each geologist, this department of the work has been committed to one person. The governor has, we believe, taken great pains to secure to the state the services of persons in all respects well qualified for the duties assigned them; and has almost completed the list of appointments.

John Torrey, M. D., Professor of Chemistry and Botany in the College of Physicians and Surgeons, New York, &c., is appointed Botanist, and is to execute the botanical department of the survey.

Lewis C. Beck, Professor of Chemistry and Botany in the New York University, &c., is appointed Mineralogist and Chemist, and has charge of that branch of the work which relates to the chemical analysis of the minerals, soils, &c.

James E. De Kay, M. D. author of numerous papers on the Geology and Zoology of the United States, has charge of the Zoological Department.

William W. Mather, for several years Professor of Mineralogy and Geology in the Military Academy at West Point, is appointed Principal Geologist to execute the survey of the first district. His assistant has not yet been selected. The first district is composed of the following counties—Suffolk, Queens, Kings, Richmond, New York, Westchester, Rockland, Putnam, Dutchess, Orange, Sullivan, Delaware, Ulster, Greene, Columbia, Rensselaer, Albany, Schoharie, Schenectady, Saratoga and Washington.

Ebenezer Emmons, M. D., Professor of Natural History in Williams College, has been appointed Principal Geologist for the second district. James Hall, instructor in the Rensselaer School at Troy, is appointed the assistant. This district contains the counties of Warren, Essex, Clinton, Franklin, Hamilton, St. Lawrence and Jefferson.

Timothy A. Conrad, author of a work on the "fossil shells of the tertiary formations of the United States;" Monograph of the American Uniodeæ, &c. is appointed Principal Geologist for the third district; and Geo. W. Boyd, M. D., curator of the N. Y. Lyceum of Natural History, is appointed his assistant. This district includes the counties of Montgomery, Herkimer, Oneida, Lewis, Oswego, Madison, Onondaga, Cayuga, Wayne, Ontario, Monroe, Orleans, Genesee and Livingston.

The fourth district includes the counties of Otsego, Chenango, Broome, Tioga, Cortland, Tompkins, Seneca, Yates, Steuben, Allegany, Cattaraugus, Chautauque, Erie, and Niagara. Lardner Vanuxem, late Professor of Chemistry and Mineralogy in Columbia College, South Carolina, has been appointed Principal Geologist for this district. The assistant has not yet been selected.

TRADE IN BIRDS' EGGS.

The Portland Courier tells us that the schooner Martha Jane, of Fall River, arrived there on Wednesday, from the coast of Labrador, with two thousand dozen of Sea Gulls' eggs. They sold readily at twenty-five cents a dozen. A portion of the cargo were to be carried to Boston. They are the grey gull's egg, nearly twice as large as the common hen's egg, some of them blue, and some white with black spots. It is said these eggs are found in such large quantities, that many vessels make a profitable business in carrying them to market.

The Portland Advertiser says, that they are the eggs of a species of bird called the Murrh, that has, from time immemorial, monopolized the business of egg making on the Labrador coast. The eggs are the size of a large turkey or goose egg, in the shape of a bell pear, and of all the colors that can be found among the latest patterns of calicoes. They are stowed in the hold of the vessel like common stone ballast, and are selling off rapidly.

Extracts from the Journal of the Franklin Institute.

LIST OF PATENTS ISSUED IN JANUARY, 1836, FOR IMPROVEMENTS OF MACHINES, &c. TO BE USED IN AGRICULTURE, OR DOMESTIC ECONOMY.

With remarks, by the Editor of the Journal of the Franklin Institute.

For an *Elastic revolving belt Saw;* Benjamin Barker, Ellsworth, Hancock county, Maine, January 6.

The patentee says, "what I claim as my invention, and not previously known in the above described machine is, the elastic revolving belt saw, and the manner of using the same. I do not therefore, claim as my invention any of the other several parts of said machine, nor their particular combination." If the patentee could have made any new arrangement of the parts for operating this saw, he might have claimed such arrangement with some propriety, but the saw itself which he does claim is quite an old affair; it is mentioned in Rees' Cyclopædia; has previously been patented more than once in the United States; has been repeatedly tried, and as frequently abandoned as worthless in operation; and such will again be its fate, should it again be essayed by the present patentee.

For a *Forest, or Tree Saw;* Walter Hunt, City of New York, January 6.

Considerable ingenuity has been displayed in the arrangement of the apparatus described and figured by the patentee, who has made his invention fully known. The apparatus consists of a *grapple* by which the whole is to be attached to the tree to be felled, by means of a screw, spike, &c.; the *lever*, to which one end of the saw is to be attached, and which, by being moved backward and forward horizontally, operates on the saw; the *saw* and a *spiral spring* by which the latter is to be kept up to its cutting bearing. The particular construction of these parts we shall not attempt to describe. The patentee claims "the style of construction, combination, and arrangement of the *forest tree saw*, as above specified, &c." We shall not, as we have said, attempt a particular description of the proposed arrangement of the parts of this machine, but predict that it will share the fate of other saw machines for felling trees, and be found by far less efficient than

the axe of the woodman. We apprehend that the patentee has not had much experience in clearing land, or he would have known that his wedges and other contrivances would not enable him to determine the direction in which his tree should fall, and that the experienced axeman is sometimes at a fault in this particular, an event which would be fatal to the whole apparatus before us.

For *Separating foreign seeds from Clover Seed*; James Manning, Lambertsville, Hunterdon county, New Jersey, January 6.

A screen, or riddle, is to be made in the form of a flour bolt, or otherwise, and this is to be covered with wove wire, the meshes of which are oblong, and a little narrower than the diameter of the clover seed; the claim is to the "making these apertures of an oblong figure." This patent will take rank with those which are the least worthy of an exclusive right, for however good such a screen, sieve, or riddle, may be, it has been so common as to render the idea of claiming it as a novelty truly ridiculous.

For a *Washing Machine*; Joab H. Hubbard, Bloomfield, Harford county, Connecticut, January 6.

By this machine the clothes are to be "pounded" in a box, upon the bottom of which there are pins projecting upwards; the pounders, two in number, having pins on their lower sides which pass into the spaces between those within the box. The pounders have each a rod extending up from them through the lid of the box, and these being operated upon by cams and springs, are raised by the former and forced down by the latter. A horizontal shaft carrying a cog wheel, and turned by a winch, causes a second shaft, having a pinion on it, to revolve, this latter, carrying the cams, or lifters: rather a complicated child of ingenuity this, and one, which we opine, will not find many foster mothers.

For a *Mill for cutting Grain and other articles;* William Gerrish, Portsmouth, New Hampshire, January 11.

Two iron plates from six to eighteen inches in diameter, constitute the cutting, or grinding, part of this mill. The under plate is to be the runner, and to be driven by any proper gearing; both plates are to be slightly conical. The upper plate is to have several perforations in it, which are to receive cutting irons, fixed and operating in the manner of plane irons. Besides these cutters there are ridges, or teeth upon the grinding faces. The claim is to "the cutters and cavities, their particular arrangements and principle, applied to this purpose."

For a *Machine for Planting Corn*; Charles R. Belt, Washington county, District of Columbia, January 15.

There are many patented machines for planting corn, cotton, and other seeds, so nearly resembling each other, as to constitute different modifications only of the same machine, and such is the character of the one before us. The claims made are confined to two particular points in which the patentee considers his machine as excelling its predecessors, but its superiority not being apparent to us, we shall pass on to other matters.

For a *Plough*; John Dolhaner, Canton, Stark county, Ohio, January 15.

There is nothing claimed as new in this plough, but the mode in which the parts are fastened together, so as to give it the desired stability.

For *securing Wells from the influx of Surface Water*; Levi Kidder, city of New York, January 15.

"The principle of this improvement consists in the construction of hydraulic cement, of a protecting cover and sides to wells, cisterns, reservoirs, and other vessels in the earth, whereby the water within them will be secured against the influx of surface water, and the intrusion of vermin in the mode and by the means substantially as described."

The mode described is to raise a wall of cement upon the ordinary wall of the well, to cover this with a top in the form of a dome, leaving an opening in the middle for the pump body.

For a *Machine for pressing Tobacco in*; J. Beverly Allen, City of Richmond, Virginia, January 15.

This machine for pressing tobacco in, is merely a square box, four of the sides of which are of tin, the other two being of wood. The patentee says that "before this box was invented, the manufacturers of pressed tobacco were compelled to use oaken boxes, the material for constructing which has recently become very costly, and difficult to be obtained. What I claim as my invention, and not previously known, in the above described machine, is the use of tin for four sides thereof, instead of wood, which was before exclusively used."

For a *Plough*; Samuel Witheron, Gettysburg, Adams county, Pennsylvania, January 15.

The whole description is as follows: "The improvement consists in placing a roller under the beam, near the centre of the plough, in or near a perpendicular position; the roller may be made plain, ridged, grooved, or otherwise. The use of the roller is to prevent the plough from choaking, by rolling off the vegetable matter that usually collects under the beam."

For an *Art, or method, or process, of lessening the consumption, and of increasing and otherwise improving the effects of fuel*; Isaac Orr, Washington, District of Columbia, January 20.

It is not easy from the title, to tell for what this patent has been obtained; whether for a stove of a particular construction, or for the art of managing the fuel. The claims however, fifteen in number, relate principally to matters of construction, but in a way so general and diffusive, as not by any means to enable us to distinguish those things which are intended to be the subject of the patent "from all other things before known or used," as required by the act of Congress. The principal feature in the stove which the patentee denominates the *air-tight stove*, is the so constructing, or making, the sliding or other doors which open into the stove, that when closed they shall be, as nearly as may be, air-tight, by which

means the combustion of the contained fuel, may be completely controlled, and but little, or no consumption take place, whatever may be the quantity within the stove. That such a stove cannot, and must not, be made perfectly air-tight, will be at once admitted, and we are not aware at what degree of good fitting, the affair would be entitled to a patent. We have a stove in which the design was to make the doors, and the ash drawer, fit as closely as possible, so that the fire might be regulated by the drawing out, or closing, of the latter; this is one of Spoor's, and there are many others similarly constructed in this respect, and in which, were the workmanship made a little more perfect, without any change of structure, all that Mr. Orr proposes from this arrangement would be accomplished.

In addition to the close doors, the patentee has grate bars placed under the fuel, resembling the revolving vertical dampers, or valves, used in some stoves, and consisting of two plates with openings, which may be made to coincide, or which may be closed by the unperforated parts. If we do not greatly err, such a grate will be obstructed by the coal, and choaked by the ashes. There may be enough in some of the individual arrangements pointed out, upon which to found and sustain a claim, but they are not made to stand alone, and it is not in our power to put them in a situation to do so.

For a *Portable Reflecting Baker;* Lorenzo B. Olmstead, Binghamton, Broom county, New York, January 20.

This tin baker is to be heated by means of a cylinder of sheet-iron, which is to contain ignited charcoal, and to pass vertically down through the back of the box which constitutes the baker. This latter is a kind of eight sided oven, the top being ridged like a roof, and the bottom in the same form inverted, the back circular, and the front, which lifts off, being straight; we mention these things because the peculiar form is claimed. The articles to be baked are put into pans, which stand on wires within the baker, and the fire being kindled, and the front reflector affixed in its place, we are assured that the desired operation will be "performed sooner than in any known oven or baker, with an immense saving of fuel."

For a *Thrashing Machine;* Eleazer Brown, Chenango, Broom county, New York, January 20.

This thrashing machine consists of a hollow cylinder about three feet in diameter; its length is not mentioned, but from the drawing, we should suppose it to be, at least, twelve feet. It stands horizontally in a frame, and within it revolves a shaft, which carries four, or any other number of rows of wooden beaters. The grain is fed into the cylinder through an opening in its side, near to one end, which is closed, the other being left open. On the shaft near the closed end are spiral fan leaves, which force a current of air through the cylinder. The patentee says that "the rapid motion of the shaft separates the grain, and the strong current of air driven through the cylinder by the fans, carries out the straw and grain." There is no claim made, the general construction being probably considered as new, which we believe it is.

For a *Horse-Power;* Samuel Newton, Dayton, Montgomery county, Ohio, January 20.

This horse power is one of that kind which receives its impulse from the walking of the horse, or other animal, upon an inclined floor forming a chain of slats, the patentee calls it the "Friction Obviator, or Double Chain Horse-Power," in which is combined the joint application of two continuous, or endless, chains. The second of these endless chains consists of rollers connected by suitable straps, which sustain the movable floor by running upon a suitable railway under it, the part not so employed hanging down beneath the floor. After a full description of the apparatus a claim is made to "the particular manner of constructing the friction chain," &c. We could refer to several patents taken in the United States, for a perfectly similar contrivance; but will go farther back than any of these, and look in the second volume of the first series of the Repertory of Arts, p. 366, where we find the same machine described and figured, having been patented in England, in January, 1795.

For a *Plough;* John P. Chandler and Peter Ranger, Wilton, Kennebeck, Maine, January 20.

We have, for brevity's sake, called this a plough, but the patentees denominate it a "Machine for ploughing land," and indeed from its complexity it appears to require some such appellation. It has an axletree and two wheels, like a cart, with a frame somewhat like that of a cart body, sustaining a tongue to which to attach the horses, together with other appendages. Under this frame there are to be three ploughs abreast, all of which are to be managed, by means of levers and suspending chains, by a person seated on the machine; the ploughs being so suspended that they can be raised or lowered at pleasure. The claim made is to "the using of two or more ploughs at the same time, and with the same team; and also having the plough suspended so as to have the weight of it carried on wheels." The patentees might, probably, sustain a claim to their own mode of doing these things, but double ploughs have often been used, and wheeled ploughs are represented in the books, and are common in Europe.

For a *Corn Sheller;* Warren Carpenter, New Castle, Mercer county, Pennsylvania, January 23.

A plank is to be slid up and down between two cheeks, grooved for that purpose; into each side of this plank iron pins are driven, which project out a short distance. The corn to be shelled is to be dropped in between this slide, and two pieces of plank near the lower end of the frame, which are borne up towards the slides by springs; these spring pieces of plank are armed with teeth, like the slide. The slide is to be worked up and down by hand. The claim made is to "the particular structure, combination and arrangement of the respective parts."

For a *Machine for Packing Flour in Barrels;* Jonathan F. Barrett, Granville, Washington county, New York, January 23.

This is certainly a new, and, we think, a good machine. The flour to be pressed, runs into the barrel in a continuous stream, and the pressing commences at the bottom, and goes on until the

barrel is filled. The barrel is placed on the bed of the press, and above it there is a vertical shaft, which is made to revolve by a drum and band, and is capable of rising and falling through the height of the barrel. At the lower end of this shaft there is what is called a screw, but this essential part is very imperfectly described; it is nearly of the diameter of the interior of the barrel, and appears to be a transverse section, containing a single thread of a screw, and it has, of course, an opening from its upper to its lower side, through which flour may pass. The shaft, we suppose, must revolve in a direction tending to raise this section of a screw, and the bottom of it, forming a spiral inclined plane, presses upon the flour as it passes through the opening, having to operate upon thin successive strata only, and thus gradually rising to the top, when the packing is completed. The shaft is loaded with any amount of weight which may be found necessary, and there is appended to it the apparatus necessary for raising and lowering the shaft rapidly, when requisite. The claim made is to the employment of "a screw on the end of a weighted shaft," in the manner described.

The patentee says that about three minutes completes the pressing of a barrel of flour; the manual labor, however, not exceeding five seconds; that during the operation there is not any bursting of hoops, or pressing of flour out of the sides; that with a machine made to test the improvement, one man can readily pack, weigh, and nail off, about twenty barrels per hour.

For an improvement in the *Garden Hoe;* Adna Allen, Ramapo, Rockland county, New York, January 23.

This patent is taken for the manner of attaching the shank to the plate of the hoe, so as to render it secure from working loose. The plate or blade of the hoe, is perforated with a square hole; the shank is made to fit this hole, and has a collar formed on it which comes up against the plate; a second plate, like a washer, passes over the shank on the face of the hoe, and the whole is secured together by riveting; the shank is secured in the handle by a ferule, and fastened by a key driven through both. The claim is to "the collared shank, back plate, and rivets, viz: the collar on the shank, and the principle of attaching the back plate to the plate of the hoe."

DEBATE ON THE CROW BILL, IN THE SENATE OF VIRGINIA, FEBRUARY 9, 1826.

(*Reported by a silent member.*)

[The subject of the burlesque report which, by request, is here published, is one of the very few on which the Legislature of Virginia have acted, for the purpose of aiding agricultural interests—and on that account, more than for the importance, or the wisdom of the action, it may perhaps deserve to be recorded in the Farmers' Register. As to the *manner* of the report, burlesqued and changed as was the form, to suit both the humor and the metre of the writer, we can testify that the substance of each speech is at least as well preserved as in the ordinary *prose* reports of debates—there having been as little taken away from the oratorical graces in the one case, as is usually furnished by the reporters in the other.]

——Crows and choughs that wing the midway air
Show scarce——

Shakspeare.

Mr. M——y.

By that bill Mr. Speaker, 'tis meant to propose
The form of a law for the killing of crows;
A county requests us—the county Fair-*fax*,
To place it as one in the list of our acts.
I'm sure Sir that you and that every one knows
How *very* destructive to corn are the crows;
There is not, perhaps, any bird, Sir, that hops,
That pulls up as much of the cornplanter's crops;
They gather by thousands, and tear with their bills
Each plant as it peeps through the top of the hills;
I see, Sir, this subject produces some mirth,
But let not a crow, Sir, remain upon earth.
If the West is to pay for the wolf and its whelps,
Why may not the East for the crow or its scalps?
I hope then, the Senate will pass, Sir, the law,
We wish not in Fairfax to hear a crow *caw*.

Mr. R——n.

Mr. Speaker, I move to amend the crow bill
By adding to those who have license to kill:
Insert after "Fairfax" the words "Isle of Wight;"
"Southampton and Surry" you also may write.
'Tis not that *I* have—oh no, heaven knows,
A thirst, Mr. Speaker, for blood of the crows,—
Prince George and the crows are on very good terms;
We want them to eat up that pest, the cutworms.
But *some* of my counties complain with Fairfax,
And is'nt it right they should come in for snacks?—

Mr. M——y.

With this bill, Mr. Speaker, some wags down below
Are strongly suspected of "*picking a crow.*"
Against that amendment, I therefore shall vote,
We might just as well catch the *bill* by the *throat;*
'Twill excite such a laugh in a certain great hall
They'll scout from the House the amendment and all—
I hope, Sir, the bill will be then let alone,
This amendment will cause it to die with a *groan.*

Mr. P——e.

Mr. Speaker!!!! I hope the amendment and bill
Will find in the Senate no jot of good will.
To hold out a bounty in *any* such case
Is simply rewarding the vagrant and base;
From labor productive 'tis taking away Sir,
Your hundreds to idle and waste all the day Sir;
Instead of promoting the true *wealth of nations*
'Tis taking men off from their suitable stations,
From digging, from grubbing, and other hard blows,
To shooting their guns at a parcel of crows.
But Sir, I assert it—'tis true on my word,
The crow is in fact a carnivorous bird;
He does'nt *like* corn sir—he *would'nt* eat grain,
He'd strut by the thing in a fit of disdain;
If he only could get flesh enough for his turn,
What you think is his passion, he'd caw at and spurn;
'Tis mere "Hobson's choice" with him when his scorn
Is seen to relax, and he gobbles your corn.
I would ask too the member who urges this tax,
If it be not unwise in the county Fair-fax?
If the end is effected, this crow bill enforces,
What *is* to become of *his mass of dead horses?*

Mr. C——l.

It may seem, Mr. Speaker, to some of the counties
To be a small matter, this granting of bounties—
But long have I thought, Sir, 'twould be very wise
In planters, some plan of the kind to devise.
The interests of husbandry, calling now louder,
Must have something stronger than smell of gunpowder.

These birds come upon us like hordes, Sir, of Huns
And take care to keep out of range of our guns;
Some people have tried a contrivance we know
Which all have consented to call a scare-crow;
But I've seen them light on it with great *nonchalence*,
And hopping about as if learning to dance.
A plan *I* once thought of, I'll freely disclose,
'Twas to grant, Sir, *a pension* to each of these crows:
If I gave them as much of my corn as they'd eat,
I thought that to steal it, would not be so sweet;
But alas, Mr. Speaker, they'll just as soon go
To the corn you have planted, as that which you strew.
I own Sir, a farm in the old Northern Neck,
Where crows would outnumber the grains which they peck,
And unless some provision is made in our laws
I fear Sir, the planter must give up his cause.

Mr. R——n.
Although, Mr. Speaker, I moved that three counties
Should also partake of these ruinous bounties,
I did it alone from a sense of my duty,
And not that *I* saw in the scheme any beauty.
What the gentleman said who was last on the floor,
In the truth of my *dogmas*, but rivets me more;
The plan of a pension we've heard him rehearse,
Has proved, like the *poor laws*, an infinite curse.
His system Sir, failing, conclusively shows
It swells but the number of paupers and crows;
Malthus and others have proved that such laws
Increase but the cramming of *bellies* and *craws*.
I therefore shall vote Sir, against the whole bill,
And I wish that the Senate would help me to kill.

Mr. C. J——n.
That bill, Mr. Speaker, proposes to *tax*
All who reside in that county Fair-fax—
The *grower* of corn and he who grows *none:*
'Tis *wrong* Sir, injustice like this should be done.

Mr. F——y.
A law about wolves, Mr. Speaker, 's been made,
And a tax on the county requesting it, laid.
The man who *grows* wool and the man who does *not*
Are surely involved in a similar lot.
The principle here is the same, Sir, I trow;
If you tax for the wolf, you may tax for the crow.

Mr. S——p.
A *single* remark, Mr. Speaker,—the man
Who does'nt make corn, eats bread if he can.
The more that is made, the cheaper he buys,
Then does'nt he profit when any crow dies?

The Speaker arose from his arm chair at last
And ask'd if the bill in his hand should be passed,
And the "ayes" seem'd to have it, he said by the sound,
And the foes of the crows, how they crowed on the ground!!

Feb. 10.
We hasten to notice an error we fell in
Reporting this bill, as regards Mr. A——n.
That gentleman moved an amendment, to wit,—
"If laws on the subject were thought at all fit,
Those laws should be gen'ral, and each county court
In its wisdom, to scalping of crows might resort;
He thought that a body so grave as the Senate
Should not have a thing like a crow-bill within it;
If the bill should go through with its one-sided features,
Then year after year we should hear of these creatures;
'Twas best in his judgment to deal such a blow,
As would shut up forever the bill of the crow;"
And this was the speech which gave Mr. R——n
What Fairfax would call a fit of "*humgruffin.*"
"He had no objection he said to the bill—
As regards other counties,—enact what you will;
But as for *his* county, he warmly protested,
By bell, book and candles, if crows were molested,
The worms there would fearlessly riot and revel—
All chance of a crop would be sent to the devil."

ACCOUNT OF A SHEEP ON TWO LEGS.

To the Editor of the Farmers' Register.

Crawford County, Pa. July 18, 1836.

As any thing of interest connected with domestic animals would be gratifying to you to know, allow me to give you an account, in few words, of a *lamb* which walked on two legs.

Being on a visit to a friend of mine some short time since, my attention was directed to a lamb, which from having been brought forth unexpectedly to the owner, in a very inclement season early in the spring, lost both of its hind legs very near the body. The poor animal was suffered to live—and when I saw it, it could travel (upon its two fore legs) as nimbly as any of the flock, and that without raising the hind quarters, so that the centre of gravity should fall upon the fore feet. I consider the circumstance of a nature most extraordinary, and well worthy to be recorded. The animal must be endued with extraordinary muscular power: its hind parts while it is walking, standing, or eating, maintain very nearly their natural position—a little higher if any thing. It sometimes gets on its knees and eats, without however, touching any other part of its body to the ground. While I was observing it, it leaped over a stick without any difficulty, and lit on its feet. The animal is in good condition, and likely to live as long as any of the flock.

JOS. C. G. KENNEDY.

DEATH OF THE SECOND MULE'S COLT. LAND, AND OYSTER SHELL BANKS OF NANSEMOND.

To the Editor of the Farmers' Register.

Spring Hill, Nansemond Co., Aug. 26, 1836.

Dear Sir:—Permit me to record, in your Register, the death of my second colt, the issue of a mare mule, by a horse. The colt was born in August, 1835, and died on this day, having been sick two or three days. Having lost one, I was desirous of raising this. It was in fine order—the mother doing nothing, upon a good pasture. It is true, the mother nor the colt had not been housed until the night before it was taken sick. I had another colt running in the same pasture, treated in the same way, and is as yet doing well. Every thing was done for the mule's colt that could be done, but it suffered much and died at last. A passage could never be gotten through it, and when dead, I had it opened, and all that could be discovered, was, that every thing that had been given it was then in its stomach, and had never passed on to the bowels. It was blistered on its forehead—the blister drew well, but in vain: and a question arises with me—can an offspring delivered of the body of a mongrel breed, be raised? That question I should like to hear solved by those better informed upon that subject than I am. If it should be thought to be possible to raise one, I will then try the mare mule with a jack, as suggested by A. B. C. (in No. 4,) whose opinion I should like to have upon this subject.

Could you not favor us with a visit some time this fall? I should like for you to do so, and to

examine our mineral resources for improving our lands, all within the reach of the present generation—and then stand, yourself, in wonder and amazement, that we should possess so much vacant land, and so little improvement. But alas! the wild western fever is up, and we leave lands here behind us, as good and as cheap, to go into a wild speculation. I should like for you, or some person who is a competent judge, to examine the lands of our Dismal Swamp. A new discovery has been made by some enterprising gentleman, who is now making an effort to cultivate a small portion of it. There is supposed to be a stratum of marl, or calcareous earth, from two to five or more feet below the top of the earth, and I am told that such land (though covered with water in the winter) is bare of timber, save very small growth. That the swamp possesses some as fine soil as ever was, there can be no doubt; and that a portion of our country now almost deserted, and where lands is cheap, is as good as ever was, there can be no doubt. It only wants improvement. As a proof beyond contradiction, I would refer all who doubt, to the farm now owned in Nansemond by Gen. John C. Crump, who came there last January, (it is true, with a good force.) Land that never produced any thing before, now has as fine corn as the western country can produce; and you would ask how did he do it? The only answer is, that he carted out thousands of loads of calcareous earth, from what are called the shell banks, and *that* has produced it: while the very spot that he removed this earth from, produces better corn than previous thereto; and of this earth, he has more than can be removed in ages. Not only Gen. Crump, but hundreds of others can do this, if they would avail themselves of the advantages offered. All we want, are some enterprising people to begin and go ahead—being first sure they are right. My wheat crop, this year, has failed, owing to the rains in May: my corn and oats good; but corn generally injured by the wet. I hope though, we shall make average crops.

I am pleased to find that you are, at last, giving into the opinion that silk would be a profitable cultivation for eastern Virginia. If you will examine all the country, you will find that the mulberry tree is easily and quick raised; and all we want is, management to give employment to our aged and infirm negroes and little children, that generally include about two thirds of the black family.

JOHN T. KILBY.

For the Farmers' Register.

THE RESPECTABILITY OF LABOR—WHO MOST ASHAMED OF IT.

Wardsfork, Charlotte County.

Labor is of high origin, and of ancient respectabilty. It is only held in low estimation by the low-bred and ignorant part of the community. A young upstart applied to me a few years ago for an overseer's place: By way of applying a touchstone to his tenets, I told him I should expect him to work with his own hands: his sensibilities seemed to be a little touched—and he asked me if I expected him to work "like a *nigger?*" "No indeed sir," said I, "by no means—I would have you work like a *white man:* a negro, sir, requires an overseer, but you will not." He seemed to be a little perplexed at the unexpected turn I took upon him, and appeared ashamed that he had put the question; but his prejudices against labor, I think, were not removed. Labor has been honored by the example of the greatest and best men of ancient and modern times. Among the Romans, says a respectable historian, "the first magistrates, and the generals of the armies, cultivated their fields, and thrashed their grain with those hands which had vanquished the enemy and supported the state; and the Roman people blushed not to give the command of their armies to those illustrious laborers, taken from the plough. Cincinnatus was found working in the field, by those who came to salute him dictator; Marcus Curius, after having conquered the Sabines and Samnites, and driven Pyrrhus out of Italy, was possessed of only one small farm, which he cultivated himself." A fine example both for Whigs and Jackson men. Scipio Africanus, after having defeated four of the greatest Carthaginian generals, and even Hanibal himself, took up his spade and ditched—not, I presume, "like a nigger," but like a white man, and a great man. He was of a different way of thinking from our little overseer, just mentioned. There is a wandering tribe of work-haters among us, who are a serious pest to every neighborhood. They are perfectly acquainted with the minute geography of every plantation: there is not a grape or persimmon tree, that is known to the most aged opossum, but what they are perfectly acquainted with; they know the negroes, hogs, and sheep of every plantation, as well as the owners; they can tell of all the Saturday night marriages, and the Monday morning whippings, that are transacted throughout the neighborhood; who hath a negro in the woods, and how many stripes he gets on coming home; how old aunt Sukey tongued the overseer, and uncle Tom escaped from his master's cane; they are famous for bush caucuses, fence conversations, five-corn gambling, knife-swaps, and button sales with the greenhorns among the Cuffees. These are they, who are so far below envy, that are so high above work. I know not such mortal cancers on the body politic as these. They fasten more especially on the property of the virtuous poor, and suck them to the dregs. They are ever trotting from one house to another, and scenting out the meat which his industrious neighbor has laid up for his family, and nothing short of a kick would drive him home till after dinner—and when he gets seated at table, fairly or unfairly, asked or unasked, he never rises until he sees the end of all things. They trace their pedigree up to great granddaddy, and down to the tenth cousin, not after honorable blood, but to enlarge their range for sponging: they are going from county to county, from neighborhood to neighborhood, eating out their poor kin, and driving them to the west. These itinerant idlers are roving under the pretence of "getting jobs:" but it is a job of eating, and not of work, they are after. They threaten worthy characters with constables—talk the loudest of liberty and equality on court-days and musters, and swear they are as free men as any—aye, the very freest, to be sure, if freedom from work constitutes liberty. They abuse the rich for being proud and aristocratic, because they wont play at five-corns, and dance a jig with them over a potato cellar,—"how do ye do" with them over a

cup of villainous whiskey, and acknowledge them as equals. These are the characters (would you believe it) that are most ashamed of honorable labor.

I. R.

A PRECOCIOUS HEIFER.

To the Editor of the Farmers' Register.

24*th June*, 1836.

* * * I cannot lose this opportunity of informing you of a singular fact which happened in the vicinity of Hampton very lately. Capt. Spencer Drummond has a heifer of the Durham stock, only fourteen months old, which has a calf about a fortnight old, and is a much finer calf than we commonly meet with in this neighborhood, or in yours. I mention this because I consider it unprecedented.

ACCOUNT OF THE LATE ROBERT BARCLAY, ESQ. OF URY, A CELEBRATED AGRICULTURIST.

Extracted from Mr. Robertson's Agricultural Survey of Kincardineshire.

But the man who exerted himself most for the improvement of the country; the man whose labors in agriculture were the most strenuous and well conducted; and whose example had the most prevalent and most extensive influence, was the late Mr. Barclay of Ury. His, indeed, were no common powers. Of the most athletic form of body, endowed with the most ardent, energetic, and comprehensive mind, he employed his great talents as an agriculturist with the most unwearied perseverance, and to the happiest and most beneficial results. The subject which he had to work upon and to improve, or rather to subdue, was of the most obdurate nature, and to most people would have been unconquerable. But he was not of a nature to be intimidated. Difficulties tended only to excite his activity; and, adhering tenaciously to his own preconceived and well adjusted plans, he was ultimately successful.

The estate of Ury, the chief subject of his improvements, lies on both sides of the water of Cowie, and extends from Stonehaven, in a northwesterly direction, for nearly five miles. The house of Ury is situated about a mile and a half from Stonehaven, on the north banks of the Cowie. This rivulet, whose banks have been destined to receive so much embellishment from the hands of Mr. Barclay, is a small trouting stream, in general of no great capacity; but there are times when the mountain torrents, from which it is derived, come down so suddenly, and with so much impetuosity, as to swell it, in some places, more than twelve feet above its usual level. Happily, however, at Ury house, where this occurs, it is confined within strong natural bulwarks of rock, so as to prevent devastation.

Mr. Barclay succeeded his father to this estate, in the year 1760. At that time there was, except a few old trees around the mansion house, scarcely a single shrub of any value on the whole property. The Cowie, which runs for above three miles through the lands of Ury, had, in the lapse of ages, worn itself a deep channel; the land on either hand shelving towards it, in an angle more or less acute, in proportion as the soil was more or less adhesive. In general, through the whole extent of this course, springs of water from the circumjacent grounds were continually oozing to the banks, and forming into marshes and quagmires, which from time to time burst, and were precipitated, by land slips, into the river. Thus, every year the banks were becoming wider, by the breaking down from the overhanging braes of some new piece of land, to be slipped, in its turn, into the stream, which, being periodically flooded, swept the whole into the sea. The only product of these banks was a few natural alders, of no value whatever, and a coarse kind of aquatic herbage, to which cattle had hardly any access, and on which, if they had, they would scarcely have fed.

The arable land was divided into a number of small farms, each having a right of pasturage on the contiguous hills. The tillage was superficially performed with very imperfect implements. Almost every field was incumbered with obstructions of one kind or other—such as, pools of stagnant water—quagmires, where the cattle were ever in danger of losing their lives—great baulks of unploughed land between the ridges—but, above all, stones abounded, not merely on the surface, but through the whole depth of the soil. There were no enclosures; no lime was used as a manure; and the only crops were bear and oats. There was no cart nor wheel-carriage of any kind; nor was there even a road. In short, no place at that time abounded more in the evils attending the ancient system, nor enjoyed fewer of the advantages of modern husbandry, than the lands of Ury.

Mr. Barclay, who had acquired his ideas of agriculture on the fertile plains of Norfolk, could ill brook a state of husbandry like this. So soon, therfore, as he succeeded to the estate, he set about its improvement in a style which soon appeared to be neither superficial nor fleeting, but, to the utmost degree, radical and permanent. For this purpose, in addition to the lands that were at all times in the hands of the family, he took into his own management all the farms in the vicinity of the mansion, as the leases expired. And as none of them were of long endurance, he had, in the course of about 30 years, improved most thoroughly 903 acres of arable land, besides planting from 900 to 1000 acres with wood. Of the above quantity of arable land, there were originally about 300 acres, which were altogether either marsh or heath. Of the remaining 600, which were let to tenants, about one-fourth part, or 150 acres, consisted of baulks, wastes, marshes, and pools, interspersed through every field; the quantity in actual tillage never having exceeded 450 acres. So that, on the whole, Mr. Barclay has meliorated about 450 acres, and brought them, from a very imperfect, to the most correct state of culture; and improved, from a state originally of the most barren and forbidding appearance, about 450 acres more, which are now in a high degree of fertility.

The means by which all this has been accomplished, will form the subject of the following investigation, and fall to be related under these different heads. 1. Draining. 2. Trench-ploughing. 3. Removal and disposal of stones. 4. Application of lime. 5. Enclosing. And, 6. Rotation of crops. Plantations will form the subject

of a separate section; as will comparative value, another.

1. *Draining.*—This primary step towards improvement was so indispensable on the lands of Ury, that out of 52 fields, into which Mr. Barclay divided his improved lands, there was only one in which draining was not required. The sub-soil of nearly the whole was also of such an adhesive nature, that the spring water could not filter through, nor draw to any considerable distance. So much was this the case, that it was frequently requisite to form the ditches within a few yards of each other, before the purpose of complete drainage could be accomplished. One field, consisting of 25 English acres, is, in particular, still pointed out as a remarkable instance of this. It cost £150 for merely the opening of the ditches, though these were contracted for at the low rate of three farthings the ell. This gives 48,000 ells for the field, or 1920 for the acre. And if we suppose the ditches to have been two and a half feet wide, (and, in such a marshy soil, less would not have kept them from falling in,) the ground thus cast up would amount to more than one-third part of the whole mass; and the drains must have been, at the average, within less than five feet of each other. To this expense of opening or casting the drains, there falls to be added, the expense of filling with stones and covering again with earth. The filling with stones, at the rate of one cart-load to three ells, would require 16,000 such loads; a large part of which, if not the whole, must have been brought from a considerable distance, as it is more than probable the marsh could not, of itself, furnish such a quantity. This labor, together with the expense of laying the stones in the ditches, and covering them with earth, cannot, on the most moderate estimate, be calculated at less than double the first expense, or £450 for the whole; thus making more than at the rate of £20 the acre for draining alone. The field itself, having been thus so completely turned inside out, has altered its aspect from its originally mossy hue, to a pale white, the color of the clayey sub-soil; which, having been thoroughly pulverized by trench-ploughing, and a copious application of lime, is now, not merely fully dry, but become considerably fertile. The total expense laid out on this field, would be little short of £40 the acre; for, independent of drainage, Mr. Barclay's other means of improvement generally cost him, per acre, about £18. This expense, in the present instance, would probably do more than purchase the land after it has been improved, and would certainly have deterred any common cultivator from making the attempt. But Mr. Barclay was not a man to be easily moved from his purpose; and, having once resolved to bring his whole lands into a full state of cultivation, this field, which would otherwise have remained a blot on the surface, would not have been left unimproved although it should have cost ten times the sum.

Mr. Barclay's drains were generally two feet and a half wide at top, ten inches wide at bottom, and about three feet deep. Less dimensions as to breadth might perhaps have served every purpose of draining; but the expense of casting them would have been very little, if at all, diminished by narrower ditches. For in a soil, of which one half the substance consists of stones and gravel, and the other half of an adhesive clay intermixed with these, it becomes impracticable to cast a very narrow ditch. To this it may be added, that as the lands of Ury had such a profusion of stones on the surface, it became a relief, in the trouble of clearing them away, to have large ditches into which they might be put.

2. *Trench-ploughing.*—The next operation was trench-ploughing; and there were two objects in view from this labor; 1. To acquire a depth of soil; and, next, to get rid of stones: and the work was persevered in till both were accomplished. Previous to Mr. Barclay's operations, the quantity of stones upon the lands of Ury was, as has been already stated, immense, both on the surface and through the whole depth which the plough had ever reached. The tillage had been but superficially performed; nor, indeed, had the tenants either skill or ability to perfom it better. But Mr. Barclay soon made his lands assume a different appearance; and from being the most incumbered with stones, and from having the thinnest staple of soil, they became the least incumbered, and of the deepest soil in the county. This was not, however, an easy acquisition, nor was it accomplished at little cost. With a set of uncommonly strong implements, and with six, and sometimes eight, heavy horses in the draught, he made the plough to descend, in spite of every obstruction, sixteen or eighteen inches at once; and, after carrying off the stones, as they were turned up, as from a quarry, he repeated the operation, till, in the end, he obtained a free soil of fourteen inches deep, and of a mould fit for every agricultural purpose. The quantity of stones thus removed was in general very great, and in some cases, almost incredible—even to the amount of more than a thousand cart-loads from an acre. And the surface of the land itself was observed to have become evidently ten or twelve inches lower by the operation.

3. *Disposal of the Stones.*—This would have been a work of weary labor, had not Mr. Barclay found out beneficial purposes for almost the whole The draining, already noticed, consumed them in myriads. Perhaps more than 100,000 cart-loads or 100,000 tons weight, were thus disposed of. On this point, however, one can speak only from probable conjecture; for, of such a multifarious distribution, no account was ever attempted to be kept. But, judging merely from the vast extent of drains that were made in progress of this branch of improvement, over nearly 900 acres, and which certainly amounted to several hundred thousand ells, the quantity of stones requisite to fill these could not be less than as now stated, but was probably much greater.

It has been already remarked, that when Mr. Barclay succeeded to the estate, there was not a road on it. But as he clearly perceived that well made roads, so essential to all improvement, were indispensably required at Ury, so he set about the construction of them without delay, and was assisted in this useful work by the statute-labor of that district of the county. The length of road altogether, that was thus made through his lands, with all its ramifications, extends to about eight miles, and consumed, to good purpose, many thousand cart-loads of stones.

He had another expedient still, namely, the filling up of hollows and pools. This is a branch of improvement that does not fall in the way of ever

cultivator; but Mr. Barclay had it in abundance. The inequality in the surface of many of the fields of Ury is still very apparent; but it was much more so before he dressed them in their present form. In almost every field there were deep hollows, which in the winter, or in rainy weather, became pools, some larger and some less, of stagnated water. These did not owe their origin at all to springs, but existed merely in consequence of their situation, incumbent on an adhesive subsoil that admitted of no filtration. In the winter they were always full, but grew less as the season became drier; and some of them, in the prevalence of the drought of summer, became, through evaporation alone, altogether dry.

It is evident, that whatever might be the produce of coarse herbage that might occasionally grow in these hollows, or by the margin of these pools, there could be no crop of grain raised from them. But this was not adapted to Mr. Barclay's ideas of the use of soil, and he resolved to rid himself of them at once. His method was this:—He first caused a trench to be made, no matter to what depth, till he laid them completely dry, and thus got access to the soil at the bottom. This soil was generally of a considerable thickness, and had been acquired by a gradual accumulation of the finer particles of soil that had been washed down from the conterminous heights, and had been rendered of a still more fructifying nature from the residuum of the vegetables which, from year to year, had alternately grown up and decayed upon their margin. This was too valuable to be lost. He therefore caused it to be cut out, and to be either carted or wheeled out with a barrow, beyond the limits of the hollow. The next work was to cast in stones from the contiguous fields, and to fill it up, not merely for the space occupied by the soil now taken out, but to as great a height as the water was wont to stand in the winter season. The last operation was to carry back the excavated soil, and spread it upon the surface of the stones. Thus, a noxious pool was converted into soil the most valuable in the field. I am credibly informed, that, in many of these old pools, the quantity of stones carted into them is upwards of six feet in depth: and that the number of such instances of improvement, from that extent downwards to that of two or three feet of filling up, is very considerable indeed.

After all, these three ways of disposing of the stones, though they must have consumed a quantity almost inconceivable, have not been able completely to swallow them up; for, so very much did they abound originally, that many thousand cart-loads are still to be seen, that were tumbled, as the last resource, over the banks towards the channel of the river.

4. *Application of Lime.*—After the various and expensive operations of draining, trench-ploughing, and removal of stones, immediately followed the application of lime. Previous to the era of Mr. Barclay, the use of lime as a manure was, in this county, very circumscribed, though not altogether unknown in this respect; but, in these days, its powers appear to have been overrated. This may be inferred from the practice which then prevailed, of sowing it over the surface by the hand from a sheet, by which means, a few bushels were made to overspread an acre. The effect which this meagre sprinkling had upon the soil, is not indeed stated; but it could not have been considerable. There is, however, more reason to admire than to despise, in this particular, the exertions of those ancient husbandmen, when we reflect on the state of the roads at the time, by which the carriage of three bushels in a bag, on the back of a horse, was a work of greater labor than now to bring on a cart, three bolls. It may be remarked also, that the thin staple of earth which they had to manure, would require a proportional less quantity to produce an effect. But, be this as it may, the soil formed by Mr. Barclay, being so much deeper than the general soil of the country, required a more liberal allowance of lime, and he gave it a more liberal allowance accordingly. He never applied less, in any case, than forty bolls of shells to the acre, but more generally from fifty to seventy bolls; so that the average may be justly stated at sixty bolls to the English acre. In one particular case, viz. in his garden, which he had trenched to the depth of five feet, he applied no less than at the rate of five hundred bolls to the acre;—a quantity probably more than enough to saturate the whole mass; and, of course, a misapplication, so far as the excess might extend. The boll here specified is what is called the water measure (from being used on shipboard), or Stonehaven barley measure, of 33 Scotch pints to the firlot, or 132 to the boll.*

This bountiful application of lime seems to have had the desired effect; for, during the whole time of Mr. Barclay's practice, which extended to a period of 38 years, he never had occasion to apply lime a second time, except in two instances, in which, as the first application did not seem to operate so powerfully as he expected, he repeated the dose.

The lime which Mr. Barclay generally made use of, was imported at Stonehaven from Lord Elgin's limeworks, at Charleston on the Frith of Forth. Stonehaven may be about a mile and a half, at an average, from the different fields to which it was to be applied. This easy distance of land-carriage was a favorable circumstance to his improvements, and almost the only favorable one that attended them. The price of lime was, at first, only 1s. 11d. the boll: it was afterwards increased to 2s.; from which it rose, penny by penny, till it came to 2s. 5d., which was the highest rate that Mr. Barclay had ever to pay. These all seem moderate rates, when compared with 3s. 8d., the present price (in 1807). But this is only a seeming, not a real cheapness; for if we compare the different prices of lime with the prices of labor or of grain, at the different periods, there can be little doubt that 23 pence in 1760 was fully equal in value to 46 pence in the present year.

As Mr. Barclay applied lime to 903 acres on this estate, and limed about thirty acres a second time, and all at the rate of 60 bolls an acre, on an average, the quantity altogether thus made use of will be found to amount to 55,780 bolls; and this, at 2s, 2d., the medium rate of price per boll, will amount to 6064*l.* 10s. as the prime cost of the lime.

Mr. Barclay's importation of lime was not, every year, in equal quantities. In some years it did not exceed 1000 bolls; in other years there were more than 2000 imported; and, one year, the importation is stated at 4000 and upwards,—thus

* The boll is rather more than 4 bushels. See Scottish measures p. 98, vol 1. of Far. Reg.—Ed.

varying as the exigency of the case required. In like manner, his successor, who inherits a goodly portion of his father's ardor and energy of mind, had in one year, lately, as much land under a course of improvement, as to require an importation of 6000 bolls of lime-shells at once.

5. *Enclosing.*—When Mr. Barclay succeeded to Ury, there was not a single enclosure on the whole estate. Indeed, in a country where artificial grasses are unknown, and where the only pasture among the arable lands consists of wastes, baulks, and marshes, scattered in various directions, of every size, and in every kind of irregular shape, among the different corn fields, enclosures can make no part of the system. In fact, they could be of no use; for no beneficial application of them could be effected. A country enclosed must always be a country that, in other respects, has undergone some degree of improvement.

Mr. Barclay, in the course of improving his lands to the extent already stated, caused them to be enclosed, field by field, as soon as the previous meliorations had taken place. The whole estate is divided into fifty-two enclosures of various sizes, from fifteen to thirty-five acres, with only four fields below the first size, and five that are above the second. The least field is of four acres, and the largest of sixty. The fences are almost all of ditch and thorn hedge; the one serving as a ready conveyance to the water, and the other as a shelter for the cattle. Very few of the fences at Ury are composed of stones, notwithstanding the superabundance of that material, which lay originally at hand upon every ridge. But the stones, there, were little calculated for building, being all round, water-worn bullets, very inapplicable to a wall of any description, either with or without mortar. Most of the thorn fences have thriven exceedingly. They are, in fact, too luxuriant, some of them being little less than twenty feet high. This height gives excellent shelter to the cattle; but has a bad effect upon the hedges themselves, as the lower part, being too much overshaded, becomes open and unfencible, and requires much care, by the application of paling from time to time, to keep the cattle properly confined. It has been remarked, in general, on this branch of Mr. Barclay's meliorations, that his fences have been more accurately constructed, and more attention paid to the rearing of them, in the latter part of his improvements, than in the beginning—a circumstance which ought to be expected, as his hedgers would naturally become more expert, and perform the operations more correctly, the longer they were accustomed to the work.

A circumstance in the construction of the gates is worthy of notice, which is, that the horizontal bars are set edgeways up and down, and thus afford, by their position, the greatest strength from a given weight of wood. This may seem so obviously the best mode, as to require no particular remark; yet it is astonishing how little such minutiæ are attended to.

6. *Rotation of Crops.*—After the lands were brought into tilth, and had a due application of lime, Mr. Barclay's first crop was oats; after which began his general rotation of a four years' course—1. Turnips; 2. Barley; 3. Clover and other grasses; 4. Wheat; then turnips as at first.

Though wheat is stated as the last in the course, I shall begin with it—as part of the culture bestowed on it, in the course of the rotation, was preparatory to the crop of turnips which followed.

Wheat.—This was sown on one furrow from lea after the clover, the ground being previously dunged at the rate of twelve three-horse cartloads of well made farm-yard muck to the English acre. The time of tillage was from the first of October to the middle of November; the quantity of seed nine pecks to the acre, or about two and one third Winchester bushels. The produce varied considerably, according to the seasons. It was, in some years, not more than five bolls; in other years, it was ten: but on an average of years, it amounted to about six bolls and a half, or twenty-seven and a half Winchester bushels, from the English acre. The measure here understood is by the Stonehaven peas firlot of twenty-two Scots pints; being thus about three and a half per cent. more than the Linlithgow standard. Mr. Barclay, by the time his improvements had extended over most of his lands, had, in some years, 130 acres in wheat.

Turnips.—Mr. Barclay having applied the dung to the preceding crop of wheat, left nothing to be performed to the turnip land but the tillage only. This gave him a great advantage in the operations of that busy seed time, in which celerity in the progress is frequently more conducive to the prosperity of the crop than any other circumstance.

The ground, being brought into a complete state of pulverization by frequent ploughings, was sown, in the first and second weeks of June, by broadcast, at the rate of one pound weight of seed to the acre. This fashion of sowing the seed, Mr. Barclay had learned in Norfolk, and persevered in it to the last; and, from the very abundant crops which he always raised, it has become matter of doubt with some people, whether to sow broadcast, or in drills, the now general practice, be the most judicious and advantageous method. The greatest objection, perhaps, to the broadcast system, arises from the difficulty, in that mode of culture, of cleaning the land from weeds, as it admits of aid, neither from machinery, nor from the power of animal draught, to assist in the operation; but all must be performed by manual labor alone. Mr. Barclay's land, however, was previously so fully pulverized, and so free of all weeds, either from root or by seed, that very little hoeing was required. The only thing almost to be done, in his fields, was to set off the turnips, by thinning, to a proper distance; a work, indeed, that required no little dexterity. Mr. Barclay, however, had his people so well trained to this nice operation (in which he was remarkably expert himself,) that they could, each of them, go over half an acre in a day; so that, although he sometimes had 130 acres in turnips, the work of thinning, which was constantly done by the hoe, was always accomplished in due season. The crop, in consequence of thus meeting with no neglect, prospered exceedingly; and the plants set off by three different operations—first at three, then at six, and lastly at twelve inches distance, turnip from turnip—soon filled the whole surface, and grew to be a crop of from thirty to forty-five tons weight the English acre. The crop would indeed sometimes exceed the last, but never fell short of the first of these quantities. This vast supply of green food was consumed in two ways—in the fattening of cattle, and the feeding of sheep.

Cattle.—Of cattle, Mr. Barclay had two sets. One set of from five to seven years old, and weighing, each, from forty to sixty stones, at sixteen lib. to the stone Amsterdam, was bought in annually, in the months of July and August. The number of this class was from sixty to seventy, which were picked up in the different fairs in the county or neighborhood, at from 10 to 12*l.*, a piece. They were first laid upon his clover fields, then on aftergrass from the first cutting; and in the course of the season had also a range over the whole stubble land, till about the middle of October, when he began to draw the turnips for them, from the different fields or enclosures under that crop. His method was, to draw alternately from one half to two-thirds of the surface on the *best* of the land, and to leave the remainder to be eaten on the ground. On the inferior parts of the field, however, he left the whole to be thus consumed by the cattle or sheep (afterwards mentioned), which continued on the spot while the crop lasted. By this method, the least fertile portions of the lands were rendered, for the succeeding crop, nearly as productive as the very best.

These cattle were never fed in houses or in stalls, but at all times in the open fields, to which the turnips were carted, and spread over the surface; and there enriched, by the manure dropt, other parts of the grounds, to an extent equal to half of that on which the turnips were produced. This practice, however, is not applicable to every situation. The general inclemency of the winter season would render out-doors' feeding impracticable in most cases. But the lands of Ury having a hanging exposure, open only to the south, and intersected by different glens or hollows, are remarkably well sheltered from the storm, from whatever direction it may come; and care was taken to shift the cattle from field to field as the weather required. The lands, too, are particularly dry; so that no bad consequence, from poaching, can arise either to them or to the cattle.

This lot of cattle was fattened off in the course of the winter, and sold, from time to time as they were ready, to butchers from Aberdeen, at from 15*l.* to 18*l.* each, then weighing from 50 to 72 stones a head. Some of a larger kind, bred by himself, were, after the turnips were done, kept on upon the grass till about the end of June, when, weighing from 80 to 84 stones each, they were sold at from 20*l.* to 21*l.* a piece.

Mr. Barclay had another set of cattle of an inferior sort, which he bought in, in the month of October yearly, to about the number of four score. They were generally three years old rising four, weighed from 30 to 40 stones, and cost from 7*l.* to 8*l.* each. These were put into the straw yard, for the purpose of consuming straw and making muck. They were, however, brought out occasionally to the turnip fields, and had a picking from those left by the larger oxen. They got from time to time a larger share, in proportion as the greater cattle were sold off; till, in the end, when the turnip crop was all expended, they were put on the pastures, and completed their feeding by the months of June or July, when they weighed from 40 to 50 stones, and were sold at from ten guineas to 12*l.* each.

Sheep—Mr. Barclay bought in about 300 wedders yearly, in the month of October, from the Highlands of Banffshire, by the water of Avon, in the parish of Kirkmichael. These were a healthy and hardy black-faced breed, weighed about 12 lib. a quarter, and cost about half a guinea a piece. They were first pastured upon the stubble grounds and after grass, till they learned to eat turnips, which were daily portioned out to them till they fed upon them freely. After this, they were taken from the pastures entirely, and put into the turnip fields, where they fed in flakes erected for the purpose, and in which they had a small quantity of hay in racks. Both flakes and racks were moveable, and were carried from field to field, and from place to place in the same field, as occasion required. These wedders were disposed of from time to time, as they got into condition; beginning by the first of January, and continuing till the first of April; by which time the whole were sold off. The price was from 14s. to 16s. each, and the weight from 13 to 14 lib. the quarter; the advance upon the price having arisen more from the rise in the value of mutton in the market, than from any advance in the weight of the animal.

Mr. Barclay had also a flock of from 250 to 300 breeding ewes, which he kept generally on the unimproved part of the estate, but brought occasionally, in severe weather in winter, to get a share also of the turnips. About 60 or 70 of the oldest of these were kept on the turnips the whole season over, till they had reared their lambs, which were in general so early ready, as to be sold, from the end of March to the beginning of May, at from 10 to 12s. each—reckoned a high price then, about the year 1780. His method of rearing these lambs was somewhat singular. They were kept constantly in the straw-yard, among clean litter, and under the shelter of a shed; but the dams were turned out to the fields to pick up their food among the turnips, from which they were brought home twice a day, and all night to give suck. By this means, the lambs were always kept under shelter from bad weather, which no doubt contributed to their thriving, and made them sooner ready for the market. After the turnips were all consumed, these ewes were turned to the pastures during the summer, where they got fat generally by the end of July, or beginning of August, when they were sold at about 12s. each.

The labor required in this system of feeding was wonderfully little. Three men, with two carts and four horses, served for the whole purpose of carting off the turnips. One man drove them off, with three horses in the cart, to the different places where they were to be spread. Two remained on the field, pulling the roots, and packing them into the cart that remained with one horse. When the carter returned with the empty vehicle, he left it with the horse in the shafts, to be filled in its turn, and with the two tracers now yoked before the other horse in the full cart, set off, in full strength, with the loading. In this manner they wrought from morning to night; taking care always to leave the two carts full at night, to be early distributed in the morning, before a new supply could arrive. Two men more were sufficient to tend the whole quantity of sheep.

Barley.—This succeeded in rotation; and, from the fine order into which the land was previously put, never failed to be a good crop. The quantity of seed was eight pecks (about three and one sixth

Winchester bushels), and the produce about seven bolls (about forty-four bushels) at an average, the English acre. The firlot from which the barley boll is measured, contains, in the vicinity of Ury, 33 Scots pints, which is about six per cent. above the Linlithgow standard.

It was with this crop that the seeds were sown for the succeeding clover crop, at the rate of a bushel of rye-grass seeds, and from ten to twelve lib. of the seed of red clover. Such were the quantities used when the land was intended to be one year only in grass; but when it was meant to remain for pasture, there was added a portion of white and yellow clover, together with some rib-grass seeds.

Clover.—This was the last crop in the rotation. About two-thirds of the lands thus sown out were reserved for hay, for which the proportion of rye-grass sown among it properly fitted it. This was partly cut a second time in the same season, and partly pastured after the first crop was removed. The other third part was pastured from the beginning, as the great number of cattle kept on the lands required to be provided for accordingly.

In this manner, for two or three, and in some cases, four courses of this rotation, did Mr. Barclay employ his improved lands. At last, however, he laid them down wholly in pasture; in which they continue to this day, being among the very best in the county. The pasture grounds are let from year to year to cattle-dealers, and fetch a rent of from forty shillings to two guineas and a half the English acre.

Plantations.—The most brilliant, perhaps, of all Mr. Barclay's achievements, at least that which most adorns the face of the country, was his plantations. These were formed at a moderate expense, and yet have every appearance of becoming the most valuable part of the property. And thus combining embellishment with utility, he obtained, at the least original disbursement, the most lucrative prospect in future.

Mr. Barclay, from the first, had a propensity to ornament Ury with growing timber. Even in the lifetime of his father, he projected and carried into effect some embellishment of this kind, in the vicinity of the mansion, which was then but scantily sheltered with wood, while there was not a single tree on any other part of the estate. This project, however, the old gentleman did not much relish; partly, because it was an innovation; and partly from a regard to the welfare of his sheep, which were thereby curtailed, in some measure, of their pasture. Young Mr. Barclay, however, persevered in his intention; but was obliged to compromise the matter with the sheep, by leaving them free access to the pasture; which put him to the charge of fencing each tree with three stakes and connecting paling, to guard it against depredation. This young wood prospered greatly; and many beautiful trees in it are still pointed out, which he planted with his own hands. This happened about the year 1756.

This successful experiment encouraged him to extend his plantations; which he did upon a great scale, when, in a few years, he came to the possession of the estate, and had the means of gratifying, uncontrolled, his taste for this ornamental branch of husbandry. The ground which he first fixed on for this purpose, was the banks of the water of Cowie; which, as already stated, flows for about three miles through the lands of Ury. Through this whole extent, there is a bank shelving on each side towards the stream, on an angle more or less acute, but all too steep for tillage. These banks are, in some places, thirty yards in breadth, and in others, one hundred yards or more, from the water edge to the top of the declivity. Both sides taken together, will at an average, extend to about one hundred yards in breadth on the base; and thus in the course of three miles, will amount to fully one hundred acres.

The whole of this is thickly planted with deciduous trees, or what is here called hard wood; in distinction from the evergreens or firs, whose timber is comparatively softer and of less value. There are, indeed, a few spruce and silver firs planted near the upper margin, to afford shelter in that more exposed situation. But through nine parts in ten of the whole plantation, there is only hard wood, such as oak, ash, elm, &c. These are abundantly sheltered by the natural warmth of the hollow, which is rendered still more mild from its various windings, occasioning one part to be continually protected under cover of another, from whatever quarter the wind may blow. Nothing can exceed the prosperous state of this beautiful plantation. Many of the trees are already nine or ten inches in diameter, and from twenty to thirty feet in height below the branches; and there does not appear to be a misthriven one among the whole; amounting to perhaps 400,000; but there is every rational prospect of, at least, one fourth part coming to complete maturity. The ultimate value must be very great; nor can that prospect be at any great distance of time. In less than half a century hence, the timber wood on this river side (extending to the moderate quantity of 100 acres) will be worth more than all the conterminous 900 acres of arable land put together;—perhaps to more than even the whole arable part of the Ury estate. This assertion will not be deemed too rash, when we reflect that hard wood is now selling at from three to five shillings the cubic foot; and that many thousands of the trees in this plantation contain already more than ten cubic feet of timber each.

It has already been said, that this improvement was obtained at a moderate expense. The precise amount, however, cannot, at this distance of time, be ascertained; but it is not difficult to conceive pretty correctly what it might be. The disbursements, which neither included trench-ploughing, lime, nor removal of stones, would be limited, 1st, to draining of the swamps that originally existed in various places in the banks, and which, from the sloping situation, would admit of great facility in the operation; 2d, of enclosing with ditch and hedge; 3d, of the value of the young plants; and, lastly, of the labor of pitting and planting them;—all which, at the moderate rates that prevailed about thirty-five or forty years ago, may be safely estimated at a sum not exceeding two pounds the acre, or 200*l.* in all.

Again; the annual value of the land thus given up to planting, falls to be added to the estimate, which will be the greatest article in the account. But this will not, after all, exceed £20 a year, or 4s. the acre; which considering the general worthlessness of the pasture, conjoined with its general inaccessibility, will not be deemed too low a rent. If we take the pains to calculate, on the common

principles of arithmetic, what all this may amount to, at compound interest, forborne 70 years, which we may, from what is already seen, set down as the period of perfection in the wood—it will come to £17,856. But this sum, considerable as it may in this view appear, is little indeed, compared with the value of 100,000 trees, that may then be reasonably expected to have attained to such a state of maturity as to be worth more than twenty shillings each, at an average.

Besides this plantation on the banks of the Cowie, there are others of hard wood in various clumps, belts and hedgerows, around several, of the enclosures. There is likewise a beautiful den planted partly with hard wood, by a small rivulet which flows from the north towards the house of Ury. Altogether, in this den, and in the different clumps, belts and hedgerows, there may be about sixty acres of plantation; and of this there may be about one-third part of hard wood, with two-thirds of different kinds of fir intermixed. The whole is in a very prosperous condition; and, besides being highly ornamental, and affording much shelter, must ultimately be of great value.

The most extensive, however, of the woods of Ury are entirely of fir, upon the hill sides and hill tops of what may be called the back ground of the improved part of the estate. There, Mr. Barclay has planted upwards of 800 acres. These hills, thus clothed with wood, being of considerable altitude and seen from far, have a very happy effect in enlivening the general aspect of the country. The wood itself, however, is not all thriving. In the lower parts of the hills, where the soil is tolerably good, and where the exposure is not too severe, the firs are doing well, and have every appearance of being valuable; but, further up the hill, they get worse and worse; till, at the utmost summit, they have nearly failed altogether. This is owing, in a great measure, to the extreme sterility of the soil on these high and bleak situations; but in part also, to Mr. Barclay himself having made an improper selection of the kind of wood. He had an ill-judged partiality for the Scotch fir, esteeming it the most hardy of the pine race, and the most adapted to the climate of the country. This induced him to plant these more exposed places, almost exclusively, with this kind. Time, however, has shown, that the Scotch fir is not all a hardy plant, but among the most delicate and feeble of the fir species; and will thrive no where, unless it be in some favorite situation, such as in the deep glens in the interior of the highlands, where, there can be no question, it grows to a large size, and is a most valuable timber. In all plantations, however, along the eastern coast, the larix seems a much more hardy tree, and better adapted for an alpine exposure. Of this there is a striking example to be met with at Ury itself; where a small plot, planted with larix on the top of one of the hills, continues still vigorous and thriving; while all around, the feeble Scotch firs, after thriving a few years against the sterility of the soil, and the coldness of the exposure, have dwindled down to the size of juniper bushes.

It may be observed, with regard to the plantations on the hilly parts of Ury, that although they cannot be compared with those raised on the lower grounds, yet there is still such a considerable proportion that continue in a thriving condition, as must make them, on the whole, a very profitable concern. The original expense of planting would probably not exceed 15s. the acre; while the value of the pasture on such a wretched soil, can hardly be estimated at any thing at all. So that the whole expense, even calculating it on compound interest to the present day would not exceed £2500; a sum far less than the present value of the thriving part of the plantation, were it appreciated at only sixpence a tree.

When Mr. Barclay commenced his operations, in the year 1760, he employed only the people of the country, that were bred on his own lands, or in the vicinity. At this time the scene of his improvements was very limited in extent, and the number of his work-people not great. But in proportion as he acquired the occupation of more of his own lands, his improvements expanded more widely; and more people, from the neighborhood, to carry them on, were required. These, however, were of a cast not altogether to his mind; for he did not meet with that alert service from them that corresponded with his own ideas of activity. This set him upon getting servants from a more enlightened part of the country; and accordingly he engaged some from the county of Norfolk in England. With the assistance of these English servants, he set himself to the training of his own people to a more dexterous habit of working, and to a more thorough knowledge of his operations; some of which, such as draining, hoeing, planting, enclosing, &c. were entirely new; and all of them being on an improved principle, were of course so far an alteration of the common practice. His discipline was severe, but it was very correct. He would admit of no slovenly practice—no slighting of the work. Nor did he require any thing of his people but what he could do himself; for while he delivered out his directions in the most clear and distinct manner, he could, with his own hand, show them the true mode of performance. He could even enforce his authority with something more effective than verbal injunctions; for it is said that the clownish obstinacy of his people was not unfrequently corrected by manual discipline. I have indeed met with different people that confess (and even in some measure glory in it,) that they had the knowledge of their work beat into them by Mr. Barclay. This strict government had the happiest consequences; for not a little of the general dexterity (to be afterwards noticed) in the Kincardineshire laborers, is still to be traced to the original system of their *education*, established by Mr. Barclay of Ury. His establishments was indeed very extensive. At Ury alone, he had, in general, from 40 to 60 people constantly employed, either in the common operations of husbandry, or in the extraordinary work of improvement. He employed also from 24 to 32 work horses. He never employed oxen. He could endure no sluggish motion; and his operations were all conducted in a style of too much celerity to admit of the slow pace of the ox.

Along with his Englishmen from Norfolk, he imported several of the Norfolk implements of husbandry; more especially the wheeled plough, and the large eight horse wagon. The first of these, as being unquestionably the most correct implement of tillage, at the time, met with a favorable reception in the country, and soon spread to a considerable distance. The more simple and

equally effective Scotch plough, improved by Small, has now, however, almost entirely superseded it. The large wagon never came into general use; nor did it extend its influence beyond Mr. Barclay's own lands. It is too expensive and too unwieldy a machine to obtain much footing in Scotland.

Mr. Barclay's operations, however extensive on the lands of Ury, were by no means limited to that estate. His improving hand was stretched over a much larger expanse of country. On his other lands of Allardice, Hallgreen and Davo, situated about ten or twelve miles from Ury, he made many essential meliorations; though not to such an extent as upon Ury, which, being his favorite place of residence, he exerted himself more strenuously towards the decoration. He had also different places in lease to which his improvements were extended.

If we confine our ideas of the benefit conferred on the county, by Mr. Barclay's improvements, to the meliorations which he effected on the lands actually under his own management, his exertions, in this respect, must rank him high in the view of every intelligent and reflecting mind. But his value, as a cultivator, was not so circumscribed. There are other circumstances, that, as an agriculturist, have extended much further the circle of his usefulness. Among these may be stated the happy consequences, arising from his having instructed so many of his laborers in the most correct mode of cultivation, who, diverging in various directions, have carried the knowledge, thus acquired, to every place where they have been employed. To have been in the service of Mr. Barclay, always was, and still is, a great recommendation to any servant. Some of these have even advanced themselves into a higher class, and are distinguished as tenants, by a spirit of industry and exertion becoming the disciples of such a great master. His example, all along, had also a wide and extensive range. The fame of his improvements spread far; and the light thence diffused, has beamed in a thousand directions over the face of the whole land.

Comparative Value.—What may be the real value to the estate itself of Ury, from the improvments made on it by Mr. Barclay, is perhaps not very easy to ascertain. The only facts on the subject that I have to state are, 1st, That 47 years ago, when Mr. Barclay succeeded to the property, the rent of all that part of the estate which he afterwards improved, was £200 a year. 2d, That the rent now of the pastures, as they come to be let, year by year, runs from £2 to £2 12s. 6d. the English acre. The quantity of improved land is 903 acres; of which about 300 acres were entirely waste land, and afforded no rent at all. The improved land, however, is not all in pasture. There are three farms, comprehending 334 acres, which are under lease at a rent of from 25s. to 30s. the acre. The rent, however, of the whole estate, amounts to about £1650 a year; and there can be little question that, were it now to let, it would bring £1800, or nine times its original value. It must not however be disguised, that, owing to the fall of the value of money, this property would have rented, at present, though there had not a single improvement been made on it, at £400 a year. But this, at all events, leaves £1400 a year, as the increase of rent made by these improvements alone, on this part of the property. Now, though it should be made appear that Mr. Barclay's improvements should have cost him even more than a principal equal to the above £1400 as interest, yet, as there still remains the value of the plantations—a value that is rapidly increasing—there can be no doubt whatever that Mr. Barclay augmented his fortune by his improvements, very considerably indeed.

Mr. Barclay began his operation in the year 1760; and continued unremittingly to improve and embellish till about 1795. A year previous to this, being elected member of parliament for the county, in the room of Lord Adam Gordon, a stop was put, in a great measure, to his agricultural pursuits. He died April 8th, 1797, in the 67th year of his age.

From the Richmond Compiler of August 22.

OPINIONS ON THE PROPOSED SOUTHERN ROUTE FOR THE RAIL ROAD TO THE SOUTH-WEST.

Richmond must wake up!

The views contained in the article from the Farmers' Register,* have about them so much plausibility, and carry with them so great an air of sincerity on the part of the writer, that for such reasons they pre-eminently claim attention and reflection. Richmond is bound, by every obligation of interest and duty, to scrutinize well the purport and bearing of these remarks, and not permit her strong claims to be postponed or viewed as objects of secondary consideration. A strong feeling is at work in behalf of the most southern practicable route for the rail road; and unless we take an active part in the game about to be played, we may find that nature has been bountiful in vain. We should at least be represented in the proposed Charlotte Convention; and in the meanwhile our survey or reconnoissance ought to be made, in order that our delegates may be prepared to demonstrate, with the certainty of mathematical truth, every proposition made by them. Nothing should be left to conjecture or speculation. We have unjust prejudices to encounter. Let us not multiply difficulties by our supineness.

From the Richmond Compiler of August 23.

It will be seen that the rail road scheme to Lynchburg is beginning to warm up discussion and investigation; and well it may, for no subject is at this moment of more vital interest to Richmond. The writer under the signature of "Cary Street," has suggested some thoughts which deserve deep and careful reflection; and, with him, we think it may be well to consider whether our liberality to Petersburg, in agreeing to go round in that direction, may not be exercised at rather too great a sacrifice. Petersburg is but *twelve* miles from City Point—Richmond is *forty-five*. Produce once at Petersburg, no advantage which Richmond now possesses, can draw it here, if capitalists should think proper to locate themselves at the former place; and every one knows that "if the mountain will not come to Mahomet, Mahomet will go to the mountain." Carry the trade to Petersburg, and who will be so silly as to bring it

* See last No. p. 309.

to Richmond, adding the freight of *twenty* additional miles on the rail road, and *thirty* on the river? No one. And Richmond, with all her advantages, will be thrown in the back ground.

But we have no room to pursue the subject. The sagacious portion of the community, whose interests are in jeopardy, will, we doubt not, be on the alert. It certainly behooves them to look well to the conflict of the surrounding elements.

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From the Richmond Compiler.

SOUTH-WESTERN RAIL ROAD.

Sir,—I have read with some attention the communication (from the Farmer's Register) in your paper of Saturday, on the best route for the above road, and really the writer appears to advance strong arguments on good foundation. His facts being correct, which I have no reason to doubt, why should not his conclusions be allowed?

It is desirable, perhaps necessary, to the speedy accomplishment of this great and important line, that a route should be adopted, which will unite all its friends; but this will not be done until a pertinacious adherence to local interests shall be relaxed. Let us then be willing to concede to others a fair proportion of the anticipated benefits, and go together as in the pursuit of a common cause, if it can be made so.

It should be no serious objection, and ought to be conceded, that our neighbors of Petersburg, if they can find the best route near them, should reap a share of its benefits. We of Richmond would certainly claim the same privilege, in a like case.

But let us examine what will be the bearing of this plan upon Richmond, should it be adopted. The road would be convenient enough for all who wish to visit our city, or go thence to the southwest. On the other hand, we have a line progressing to the Valley, which perhaps ought to pass through Charlottesville to Staunton; but, if extended to Harrisonburg, will secure the travel from the great channel of communication through Virginia, westward. Between these two, will be the James River Canal, to convey produce from both quarters; and really I think we shall be pretty well accommodated, and may be satisfied to yield to the towns on either hand, the share of travel and trade which will fall to them.

One consideration to recommend the southern line is, that it will be far enough from James River to remove, it may be hoped, the opposition of the Canal Company.

I have thus briefly noticed this subject, that some competent pen may pursue it, and if possible, reconcile the clashing interests, or promote a spirit of accommodation which will be ready to accord to others as much as we claim for ourselves. I hope that both Petersburg and Richmond will be fully represented in the proposed convention at Charlotte, with instructions to pull together in any measure where mutual interests can be promoted.

A STOCKHOLDER IN THE JAMES RIVER COMPANY,
AND FREEHOLDER IN RICHMOND.

From the Lynchburg Virginian of August 22.

A NEW SCHEME!

We have received a sheet of the forthcoming (September) No. of Mr. Ruffin's "*Farmers' Register*," in advance of its regular publication, and our attention is called to a long and well-written essay contained in it, professing to inquire, "which is the best route, through central Virginia, for a railway to the southwest;" but in reality laboring to show that neither of the two routes, the advantages of which have been recently so warmly discussed, is the proper one, and that both of them ought to be abandoned, for a third, which the writer suggests. This route lies on the ridge south of the Appomattox, commencing eastwardly at the Petersburg and Roanoke Railway, a few miles south of Petersburg, (with which town it would of course be thus connected,) and passing through Dinwiddie, by Nottoway Court-house, and nearly along the line which separates Lunenburg and Charlotte on the south, from Prince Edward on the north, *leaving Lynchburg out of the line, about twelve miles, and going directly on to New London*—and thence westwardly! The main arguments urged in favor of this route, are 1st, that between Petersburg and New London, if we keep on the dividing ridge, we shall not cross a single stream, ravine or hill; 2dly, that a road upon this route will accommodate a section of country, which, at present is without the benefit of commercial facilities; and 3dly, that it will be so far distant from other improvements as to lose the character of a rival to any, while the distance will not be at all increased. Richmond is urged to support this project, by the consideration that she will still be the ultimate destination of the trade, as she will be connected with Petersburg by a rail-road; and Lynchburg is told that she may have a *branch* from the main railway, "which will be necessary and *sufficient* to accommodate the Lynchburg travel." And this scheme is warmly urged upon the consideration of the Convention which is to meet at Charlotte court house on the first Monday in September next.

Is *Lynchburg* prepared to support this scheme? Whether she is or not, we cannot say, having yet had no opportunity to ascertain the state of public sentiment in relation to it. But whether she is or not, *should she not send a delegation to Charlotte court-house, to represent and defend her interests?* If she is willing to see the great rail road to the Tennessee line pass 12 miles south of her, let her say so. If not, let her at once protest against it.

But *Richmond*, it seems to us, is vastly more interested in this matter than we are, and she is much less sagacious in perceiving her interests than we suppose she is, if she accedes to this proposition. True, she may be told that she will be the "ultimate destination" of the trade and travel on this route: and she may be so at first. But how long will this state of things continue? No longer than a rail road could be constructed from Petersburg to City Point. Who, wishing to ship his produce to an European or a Northern market, would send it to Richmond, and incur the delay of a circuitous route and the expense of transhipment, storage and drayage, when, on its arrival at Petersburg, they could wheel the cars at once to City Point, and put it on ship-board? Men are not so blind to their interest.

The advocate of this new route, however, endeavors to lull the suspicions and fears of Richmond, with regard to the effect of rivalship from this quarter—and tells her. "*If she fears rivalship, let her look to Baltimore.*" Very good advice,

we doubt not. But in what manner is Richmond to put down Baltimore rivalry by adopting this scheme? She may, it is true, check the growing disposition of the people of the south-western counties to connect with the Baltimore interest at Staunton—but can she wrest from Baltimore the trade of the rich Valley of Virginia of which Staunton is the centre? No. She can only secure the trade *both* of the south-west and of the Valley, by a rail road on the James River route, connecting with the Valley by a railway from Scottsville to Staunton.

We repeat the suggestion that it may not be unimportant that Lynchburg should be represented at the Charlotte Convention; and we hope, if our older and wiser heads think with us on this subject, that measures will be adopted to appoint delegates to that body.

From the Richmond Compiler.

WATER POWER OF RICHMOND.

We have been favored with the following extract of a letter, written by a gentleman well acquainted with manufacturing operations, having been engaged in that capacity in Pennsylvania for some time past. His opinion is entitled to weight; and we submit it at this moment, in order that it may receive the consideration it merits by the James River Board, now in session. Every one who has noticed our immense water power, will readily admit that high as it is rated by the writer, he has not made too great an estimate. Every visiter is similarly impressed, and every one wonders that such splendid advantages are permitted to lie idle. We doubt not the subject will receive early and proper attention from those who are now entrusted with the management of interests so important.

"I took as good a view of the water power as my limited time would allow; it is a stupendous power, and only requires adequate capital and proper engineering to make Richmond what nature intended she should be, one of the most extensive and important manufacturing points in the United States. I should think that the available water power at Richmond cannot be less than six times that of the water power at Lowell, which at present impels machinery that has cost, including active capital to carry on the works, more than six millions of dollars. But it is of the greatest importance that so valuable a privilege should not be cut up into petty sites. In this, the State of Virginia, and especially the city of Richmond, has a deep interest. Measures should be taken to have a large canal cut on one or both banks of the river, that would command the whole fall, and distribute the water in the most advantageous and desirable manner, to at least fifty large manufacturing establishments of various kinds. The canal should have a cross section at the water line of not less than one hundred feet, seventy feet at bottom, and ten feet depth of water. If this important work should not be completed at an early date, it is probable, indeed, certain, that in a few years such will be the number of small and conflicting establishments, that no general and comprehensive plan can be executed, by which the immense water power you possess can be made available. If you had such a canal as I have already indicated, and water power and sites were open to any one that saw proper to purchase and improve them, you may be assured that it would not be long before Richmond would have a manufacturing population not far short of her present number of inhabitants."

[It is indeed both surprising and lamentable that the prodigious water power of Richmond has not been more used for manufactures, and that the applications (except for flour mills,) which have been made of it, have not been more successful. If the scheme of the writer of the above remarks, was *properly* carried into effect, by a large canal through Manchester, that now decayed and dilapidated village might yet overtake her flourishing neighbor, Richmond, while giving to her new sources of vigor and growth. But a master mind is necessary to give impulse, direction, and success, to such a magnificent design. The remarkable success of Petersburg in cotton manufactures, with her very inferior advantages, compared to Richmond, is owing principally to the genius and energy of one individual, seconded by the confidence which he has inspired, the spirit, and the enterprise of his townsmen. Dr. John Y. Stockdell, as the projector and director of the most valuable of these establishments, has been a benefactor not only to Petersburg, but to Virginia and all the South: and if his or similar abilities were called into action to plan and direct a general system for employing the far greater manufacturing power of Richmond, the results might be expected to be increased in value in proportion to the far greater means that could be brought into operation.]—Ed. Farm. Reg.

From the Cincinnati Gazette.

INCREASE OF TRAVEL AND TRADE ON RAILWAYS.

Before the Charleston and Hamburg Rail Road was made, the travel between those places was by stages, three times a week, and averaging about four passengers each trip. Now, by rail road, an average of fifty per day, making a difference of more than twenty-three hundred per cent!

The travel between Baltimore and Washington has increased, since the rail road, from less than fifty, to two hundred and fifty per day, or upwards of four hundred per cent. The estimate is, when this road is completed to the Ohio, it will average at least one hundred and fifty passengers per day, each way; this will be found to be a very low estimate. On the main stem of the Baltimore and Ohio Road, so far as made, the travel this year is double what it was the last, and the freight has increased fifty per cent. in the same period.

On the Pennsylvania Rail Road and Canal, the amount of tonnage that passed *over the mountains*, westward, between April 30, 1835, and May 11, 1836, a period of twelve months and nineteen days, was over twenty four millions of pounds; during the same period the transportation east was ten millions of pounds, making an aggregate of seventeen thousand tons; in addition to this, more than one hundred and fifty thousand passengers crossed the mountains, exceeding three hundred per day, and three times the number that passed the preceding year.

On the Liverpool and Manchester Rail Road the travel has increased, from what it was before the road was made, from an average of less than one hundred per day, to the astonishing number of five hundred thousand in the last year, making an average of near 1,400 per day.

It is from facts like these that we must estimate the profits of our great enterprise. At the lowest possible estimate, there will not be less than one hundred passengers per day, each way, the first year, which, at five cents per mile, will be thirty one dollars for each passenger, or six thousand two hundred dollars per day, forming an aggregate of two millions two hundred and sixty three dollars per year. Allow half this amount for way passengers, and you have an aggregate of three millions, three hundred and ninety four thousand five hundred dollars, for passage money only, making upwards of thirty per cent on the whole capital invested, which may be taken for clear profit, as the freights will far more than pay every expense.

Pitkin gives the number of miles of rail road now in operation at sixteen hundred, and the cost at thirty millions of dollars. The number of miles of canal now in operation is two thousand eight hundred and sixty seven, at a cost of sixty four millions, five hundred and seventy three thousand and ninety nine dollars.

From the Journal of Commerce.

THE PROGRESS OF STEAM.

From the extent of our coast, the number of our navigable rivers and lakes, and the "go-ahead" character of our population, it is evident that steamboats have a special adaptation to our wants; and as a matter of fact, we are, in this species of navigation, quite in advance of any other nation on the globe. Not only are our steamboats, as a general remark, larger and more elegant, but their aggregate tonnage is greater. Its increase, for some years past, has been surprisingly rapid. In 1829 the whole steamboat tonnage of the United States was only 39,419 tons. At the end of 1834, beyond which the returns do not reach, it had increased to 122,274 tons, and is now doubtless at least 150,000 tons. This, at an average of 300 tons to each boat, would give a total of *five hundred steamboats*. Their speed has increased almost as rapidly as their number. If we suppose each boat to carry on an average 100 passengers, the aggregate number would be 50,000. About this number we presume, are constantly afloat in these moving palaces. In the vicinity of navigable waters, they supply, to a great extent, the place formerly occupied by stages, private vehicles, and even *legs*. It may literally be said that where steamboat navigation is available, no man can afford to go on foot. The speed of the boats has increased almost as rapidly as their number. Fifteen or sixteen miles an hour is now considered nothing extraordinary. Places which 25 years since were considered far distant, are brought so near together by this wonderful invention, that they are almost parts of the same town. The revolutions which it has effected in business and property are very great. By the facility which it gives in the transportation of troops, ordnance, and supplies, it adds immensely to a nation's defensive power; and not less perhaps, by the means it affords, of annoyance to a blockading squadron. It will in fact revolutionize the system of naval warfare. If the progress of steam is to continue in the ratio of the past ten years, it will require a forest per day to supply the consumption of fuel. In short, we see not but the expense of wood and the difficulty of obtaining it, would ultimately become so great as to diminish essentially the value of the invention. But fortunately, in this dilemma, we have another resource which is inexhaustible; the mountains of anthracite coal with which our country abounds. In a few of our boats this article is already used with success, and from its power of producing heat, we have no doubt it will ere long be preferred to wood. If there are any inconveniences or drawbacks attending its use, the inventive genius of our people will find a way to remove them. Much has already been accomplished in this respect (chiefly by Dr. Nott,) and the rest will be achieved in due time.

For the Farmers' Register.

WHICH IS THE BEST ROUTE FOR A RAILWAY TO THE SOUTH-WEST?

No. II.

The Charlotte Convention have considered and rejected the plan of a western railway south of the Appomattox, as advocated in the last number of the Farmers' Register; and have approved, and recommended the construction of railways from Danville to Farmville—from Richmond to Farmville—from Lynchburg to Farmville—and from Petersburg to Farmville.

The delegates present, when these decisions were made, were 35 in number, of whom all but 10 were from the counties of Charlotte and Prince Edward. Of the other 10, 2 were from Richmond, 1 from Amelia, and 7 from Nottoway. The votes were taken individually, and therefore it is not at all strange that the plan of the railway route from Danville to Richmond, passing centrally through both Charlotte and Prince Edward, should have been preferred, by a majority of the convention, to that of a railway for more general objects, from Richmond through Petersburg, and stretching westward along the great ridge south of the Appomattox. It is my present purpose to consider the plan last named, in the new aspect in which it is placed by the recommendation of the *intersecting route* from Danville, through Farmville to Richmond—supposing that recommendation to be effectual, and the railway, as recommended, to be constructed.

To have the clearest view of results, let us suppose both these great railways finished, and (as certainly will be, as soon as either,) the western termination of the southern ridge route extended far towards, and perhaps into Tennessee. *The point of intersection* of the two roads would necessarily be on the dividing ridge, between Charlotte and Prince Edward, and between the head springs of Bush and Buffaloe Rivers. On the diverging ridge between these rivers would be the only very good route to Farmville. The point of intersection would be necessarily determined by the meeting of these two ridges, and could scarcely vary half a mile from the spot which I assume—which is 29 miles from Nottoway Court House, 20 miles

from Farmville, and near the main road from that town to Charlotte Court House. Richmond would be the eastern termination of both routes—and the western ends of both would be undetermined—both being expected to be continued, in distant lines, far towards the south-west.

From this *point of intersection* to Petersburg, by Nottoway Court House and Cocke's Road, according to long established computation, the distance is 74 miles; and continued to Richmond 20 miles farther, would be 94 miles.

From the same point of intersection, by the ordinary computation, to Farmville, the distance is 20 miles—and thence to Richmond by the mail stage route, (agreeing nearly with, and being fully as direct as the ridge between James and Appomattox rivers,) the distance is 76 miles, or 96 in all. Thus by the present nearest and best roads, and by computed distances, Richmond is two miles nearer by way of Petersburg, than by way of Farmville.

Again—suppose the rail road from City Point to Petersburg (for which subscriptions are now in the course of being received,) to be constructed, (say 11 miles,) and united with the great northern, southern, and western lines which will all meet in Petersburg: then from the *point of intersection* to City Point, would be 105 miles—and 107 if reached by the lower Appomattox—and by Farmville, Richmond, and James River to City Point, the distance would be 146 miles.

Thus, from the common point of intersection, by the southern route, and through Petersburg, Richmond is nearer by 2 miles, and City Point by 39 miles. If, instead of at City Point, the railway connexion with James River is made at Coggin's Point, (15 miles from Petersburg,) and the northern ridge route continued by railway from Richmond to Westover (26 miles by the present road,) the comparison would be somewhat varied in favor of the latter. Still the distance from the point of intersection through Petersburg to Coggin's Point (at deep ship navigation,) would be but 109 miles, while through Farmville and Richmond to Westover, just opposite, would be 122.

For these distances, I have thought it preferable, and nearest the truth, to take the existing roads, and their computed distances, rather than straight lines on the map, and any supposed deviation which railway routes might make from either of the existing roads, whether to seek shorter, or more level courses. It may be presumed that the two routes compare fairly in these respects—and that it is as probable that one would gain as the other, in the changes made for proper railway routes.

Let us now compare the northern and southern routes, (between Richmond and the *point of intersection*,) together with their probable business in conveying travellers and commodities.

It is admitted by all, that railways cannot compete in cheapness with moderately good navigation, whether on canals or rivers, for conveying the agricultural products of a country, or any heavy commodities, not of great value compared to bulk and weight. Therefore it follows that a railway route which crosses navigable rivers, flowing by good markets, or which passes parallel and near to the course of a river, cannot be expected to receive any such commodities, when near to navigable water—nor even at a distance, except for carriage to the first place of deposite for the cheaper water transportation. While the navigation of the Roanoke and its two great branches remains as imperfect as at present, the Danville railway, which will cross both the branches, may be expected to bring to market the produce of that rich surrounding country—but it will not be so conveyed farther than to be embarked on the Appomattox, at Farmville. It is not necessary to repeat the reasons stated in my former piece, to prove that for all the remaining distance, of 76 miles to Richmond, that either the Appomattox, Willis', or James River, will be sufficiently convenient, and a much cheaper carrier of agricultural products. The same circumstances and reasoning will also show that no bulky or cheap merchandize will be brought from Richmond by the railway, for such distances as either of these rivers will serve for the transportation. Light and very costly commodities only, or others in case of rare emergency, or in temporary interruptions of navigation, will constitute all the freight that can ever be expected for the railway, in either direction, between Richmond and Farmville.

Between Staunton River and Farmville (about 40 to 45 miles,) and especially while, as now, the Staunton is scarcely used for navigation, this road will take much freight: and this section of the Danville Railway, will be the more profitable, because it also may be constructed on a continuous ridge, without crossing a stream, or a ravine.

The *southern ridge route* would convey country produce, and from a very extensive region, from the point of intersection to Petersburg—and a large portion of that produce as far as Richmond, or to James River. It is true that both the latter extensions would belong to other companies: but they will be but different terminations of the same great route, and it is proper to view the trade and travel of all the parts, in connexion. Confining the view, for the present, to the part of the route east of the point of intersection, it will be evident that it offers the cheapest and best conveyance to market for all the products of the counties of Nottoway and Lunenburg, the greater part of Dinwiddie, and smaller parts of Brunswick, Mecklenburg, and even of Charlotte and Prince Edward—and without there being any danger of rivalship from any other future improvement elsewhere. In addition, some part of the freight from the Danville road may be expected to diverge to Petersburg, or to James River, and thus increase the profits of Petersburg and of the southern route, at the expense of Farmville and the northern railway. I readily admit that when this western railway shall be continued through Campbell, that the products received above Lynchburg and Farmville, will diverge to one of these towns, and thus balance the advantage to the eastern section above mentioned. The country products collected above Lynchburg, and as far as Tennessee, would all leave the railway for Lynchburg, and the cheap water conveyance on James River. And this would be an immense and new gain of trade to Lynchburg, and to the canal—as without the facility of railway transportation, not the hundredth part of the amount of heavy produce could be brought from the south-west of Virginia, and from Tennessee.

So much for the comparative business of the two routes in conveying commodities: now let us compare the inducements to travellers.

There is already a great amount of travel in the route from Danville by Charlotte Court House, which is divided between the road to Richmond, and more northern destinations; and the number of travellers would doubtless be tripled, or quadrupled, by giving to this long route the speed and facilities of railway conveyance. The local travel along the same route, and most of which would be directed to Richmond, would also be very great —and, as on other railways, would probably exceed any previous estimates that would be considered reasonable. The share of this travel which would pass by Farmville to Richmond, and the share which would diverge to that direction from the western extension (by New London,) of the southern route, would constitute nearly the whole business of the railway from Farmville, besides its own local travel.

Now what would be the inducements to travellers coming by either of the western routes, to choose the eastern end, *north* of the Appomattox, rather than that *south* of the Appomattox? Even to all who were seeking Richmond alone, the southern route would be a little nearer, and therefore the choice of the latter would be at least as likely to occur; and to all strangers, the passage through Petersburg would offer some additional cause to prefer that route. All who wished to go to James River, or to take the steamboat for Norfolk, or for any northern or southern city, would also find the southern the nearest route. Those who have business in Petersburg, of course will take this direction. On the other hand, business in Farmville, or elsewhere in that direction, would be the only inducement to choose the northern route. For these reasons, it seems more than probable that *at least three-fourths of all the distant travel*, would be continued by the southern route, either to or through Petersburg.

The comparison of country products and other commodities, carried, would show a far greater preponderance in favor of the southern route. The service rendered to the public by the two roads, will be measured by the amount of produce carried to market, rather than the amount of distant travel: and if estimated by that rule, the southern route will be found highly beneficial and profitable to a large part of Virginia which is now almost deprived of market by its location—while the northern is not wanted, and would be used, but to a very small extent, for any such purpose.

Next let the facilities for construction be compared.

In the first place, let it be borne in mind, that 24 miles of the southern route, from Richmond to about three miles south of Petersburg, will have been constructed by other companies, and for other profitable objects, before any other part of the great western railway will be ready for use. In this 24 miles, will be embraced all the very difficult and expensive ground, steep inclinations, and bridges, that will be necessary in the whole route. Then the length of railway, on the southern route, requiring to be constructed by a new company, is short of the distance from Richmond to the point of intersection with the Danville railway by 24 miles—and of course rather more than 24 miles less than the actual length of construction required for this single object, on the route north of the Appomattox.

From the point of intersection of the proposed western, with the Danville railway, to Petersburg, and from the same point to Richmond by Farmville, both routes are on ridges, except where the latter crosses the Appomattox, and perhaps for some miles next to Richmond: and with these exceptions, it may be admitted that both routes are equally suitable for railway constructions, and mile for mile, would be equally cheap.

Next as to the comparative ability, and willingness, to pay for the construction of the two rail-ways.

This question has been already, though indirectly, discussed and sufficiently settled, when comparing the probable business and receipts, and probable cost of the two railways. The country which the adoption of the southern route would place near to market, together with the town of Petersburg, can easily and profitably pay for this road, without aid from foreign capitalists, from the surplus fund, or from the legislature in any way, except in the granting a charter of incorporation, which there can be neither reason nor pretext for denying. It is left for others to judge whether the small interest that *exclusively* demands a road on the northern route, can afford to pay the cost of its construction; and if not, whether from the treasury of the commonwealth the deficient amount can be expected, or ought, in justice and propriety, to be supplied. It is certainly not the *great Richmond interest proper* (—an interest which is, and ought to be, specially guarded, as next in importance to the general interest of Virginia—) which demands the use of the *northern*, in preference to the *southern* route. That a railway from the south-west to Richmond is most desirable—*nay, indispensable*—will be admitted by all. But Richmond, however deeply interested in obtaining this great improvement, will not *pay the cost* of an unprofitable mode of obtaining it, when one equally serviceable, and highly profitable, is available—and to which the sole objection (and an objection which commercial jealousy alone can entertain,) is, that the route would pass through the smaller town and worse market (as it is said to be) of Petersburg: and if Richmond will not pay for a work which will subserve her interests *exclusively*, no considerable aid can be expected from any other source. If Richmond will, in every way, profit by the great South-west Railway, (or "James River and Tennessee Railway," as it may hereafter be truly named,) let her join, and take her proper share, and exert her proper influence, in the scheme which promises most profit, and best to serve the general interest—and not oppose what will incalculably promote the prosperity of Richmond, *because* it will also benefit what mercantile jealousy considers to be a dangerous rival.

It is scarcely necessary to add that the change of circumstances which the Danville road (if constructed) will present, promises to make the southern ridge route even more profitable than it otherwise would be. Its first great section, to the Danville road, will, by that road, be brought into earlier and more productive use—and the work may there pause until it is deemed advisable to stretch farther westward, to join the road from Tennessee to Lynchburg. The benefit to be expected from this connexion with Danville, will more than counterbalance any diminution of profit caused by the extension of the road from Farmville to Richmond—admitting that extension to be certain to be made.

My first article on this subject, though received by the public with far more notice and respect than I had expected, nevertheless was considered by each town as hostile to its interest, and as favoring what its jealousy deemed the adverse interest of some other. Such opinions were at least expressed in the papers of Richmond and Lynchburg, and were entertained in Farmville. I have seen a letter from one of the most considerable and intelligent capitalists of that spirited and thriving little town, in which, commenting on the argument of R. N., he says that he considers the writer's "*aim is to aggrandize Richmond at the expense of the other towns*—." The number and purport of these conflicting charges, serve to clear the writer from all; and, with unprejudiced and impartial minds, may perhaps give him the credit he claims, of laboring to serve no one separate and exclusive interest, at the expense of the general welfare—and he believes, that the adoption of his views would benefit every town on and near the line of improvement, though in unequal proportions; and certainly would injure none. The foregoing remarks on Richmond and her proposed northern route, though strictly in accordance with the views formerly presented, will probably, by some readers, be considered as indicating hostility to the interests of that city. This construction, the writer can only protest against as altogether unfounded, though he is willing to avow enmity to all narrow minded commercial jealousies, whether entertained by Richmond, Lynchburg, Farmville, or Petersburg. To the last named town, it may be considered that these views are particularly, if not exclusively, favorable. Nevertheless, an essential feature of the general scheme would be now considered by most inhabitants of that town, if adopted, as operating to remove her trade and her wealth to Richmond, or elsewhere, and absolutely destructive to her prosperity. This feature is the perfect *freedom of passage* through Petersburg, by connecting all the different railways, and thus permitting all who may desire it, to seek other markets, with the least possible delay, trouble, and expense, incurred in passing through Petersburg. Of course similar measures would be approved in Richmond and every other town: but at present the question will be considered only as it regards Petersburg.

It is an evident consequence of the positions which have been contended for, that the promised public advantages could not be even partially obtained, without the freedom of passage to trade and to travel; nor could Petersburg expect the entrance of this immense and new accession of travellers and commodities, if she opposed the slightest obstacle to the departure of either, when circumstances made such departure desirable. A close or perfect monopoly, though always injurious to the public, may be a very good thing to those who enjoy the benefit of its restrictions and impositions on others; but the *attempt* to impose such restrictions, without the power to make them effectual, serves only to produce irritation and enmity in the class whom the measure injures—and resistance and defeat to the attempt. If a town opposes difficulties to the passage of commodities to another, it amounts to an admission that she offers a worse market than her neighbor: and whether such is a fact or not, those persons whose commodities are designed to be stopped, will act upon the admission, and determine to surmount all obstacles, and proceed to what they will consider the better market. The prevalence of an opinion, even if it be false, that a particular town is a better market, tends to make the opinion true, by giving to it increase of trade, and thereby drawing to it accessions of capital and population, all of which produce competition, and at the same time enable the competing merchants, by increase of business, to buy at dearer, and sell at cheaper rates, than a smaller trade would afford. There are plenty of existing difficulties in the passage from the Appomattox basin through Petersburg to deep tide water—and yet in spite of these obstructions, more than half of the tobacco brought down the canal is sent through that town down the Appomattox, and up James River to Richmond--whence it is to return down James River, to reach foreign markets. Now suppose it were possible to remove every such existing obstacle, both natural and artificial; would that change cause a greater loss of trade? On the contrary, it would greatly increase the whole amount of tobacco brought to Petersburg, from the southern counties that now carefully avoid it; and though the quantity sent away would be greater (at least at first,) so would be the quantity that would find there a market.

So of commodities received by the southern and western railways. The perfect ease, and small additional cost, of sending them on to other markets, would remove all objection to bringing them first to Petersburg; and of the new and great supply thus sent, even though *all* of it might be designed to be sent farther, a portion would certainly remain—and that portion would increase, as circumstances served to increase the general business of Petersburg, and of course its value as a market both for purchases and sales.

With regard to travellers by railways, it is still more absurd to oppose difficulties to the transit, which to make, was their sole object in coming, and which no one expects to prevent. But still it is the policy of every town to oppose a *little* obstruction, in delay, trouble and vexation, more than of actual expense, to every traveller who comes on one railway to pass away upon another. "Compel every traveller to leave a little money in the town, if it is only a quarter of a dollar to a porter for carrying his trunk." Such was the jocular remark which I heard from a merchant of wide and liberal views in general; and it accords well with the general opinion as to prohibiting the junction of different railways, or other lines of travel and trade. A traveller, anxious to hasten onward, will scarcely pay less, in detention, trouble and money, than a dollar, in passing from the Petersburg and Roanoke, to the Richmond and Petersburg Railway, even though they may approach within half a mile. This tax is his loss, while scarcely the eighth of it is the clear gain of the porter, and still less that of the town. The effect is precisely such as adding a dollar (perhaps more) to the railway fare, and to that extent operates as a discouragement to the use of the line of travel, and an inducement to prefer any rival line that is as cheap in direct expense, if not accompanied by such *indirect* taxes.

Suppose that the law had given to the town of Petersburg authority to impose a direct tax of fifty cents on every traveller who passed through by railways, and as much on every bale of cotton or

hogshead of tobacco that passed by the same conveyances to Richmond: Would it be good policy to exercise this right of taxation? Every man would pronounce the imposition to be as impolitic as illiberal, and tending to drive both trade and travel from the town, and to injure the railway, the construction of which has added so much to the wealth and to the character of Petersburg. Yet though such a tax in money, which would at least be so much gain to the town treasury, would be rejected, a tax equally heavy is indirectly levied, with general approval, and of which nearly the whole amount is lost to every body. As a prohibition on departure, it is altogether inoperative: for no farmer will be deterred by such a small obstacle, if he is desirous of conveying his crop to what he is taught to believe a better market. These may be small matters—but they involve important and widely operating general principles.

If then the entire plan of improvement which I advocate was executed, and the Danville road brought across it, whether to stop at Farmville, or to continue to Richmond, I conceive that the advantages to the several towns would be divided somewhat in the following manner.

To Lynchburg would pass,(by the branch railway before proposed,) either to be there sold or to proceed down James River to Richmond, all the produce brought from the west by the railway, and its future extensions towards and through Tennessee. The rich supplying back country which Lynchburg now has in the counties of Patrick, Henry, Franklin, and part of Pittsylvania, could not possibly be attracted from the present market by the great western railway—and would in some measure be aided by it in getting to Lynchburg. The Danville road could certainly take part of this produce—(and so will the Roanoke when properly improved—) but whatever injury Lynchburg may ultimately sustain in this manner, will in no degree be increased by the great western railway passing in her rear. It is absurd to suppose that country produce and returning merchandize would prefer railway to canal or river carriage—and such preference only, could cause Lynchburg to lose any trade by the plan proposed. Of course, in this as in other cases, the direction of trade will depend much on the reputation of the towns as markets. A portion of this rich country around and near Danville, when all these improvements are made, may choose as a market either Danville, Clarksville, Norfolk, Lynchburg, Farmville, Petersburg, or Richmond—the access to all these being more or less facilitated.

Farmville would receive all her present trade, and a great addition, by the new facilities opened by the western road into Campbell county—and still more by the new trade brought by the Danville railway. Farmville reached by the branch railway, would be 54 miles nearer than Petersburg—which advantage would surely suffice to enable Farmville to retain all her present back country that might use the Danville road.

Petersburg would receive, purchase, and ship on James River, all the great supplies brought to that town, of grain, cotton, and all other commodities except tobacco; and of the latter crop, even if (as now) the greater part should pass to Richmond, in search of better prices, the passage through would still enable Petersburg to retain it whenever circumstances may permit—or to give it a cheaper passage seaward, by facilitating her shorter and more convenient outlet by railway to James River. The mere knowledge of the existence of such easy access to the best ship navigation, would add much to the reputation of Petersburg as a place of export trade; and together with the equally free extension of the rail roads through the town to Richmond, would tend powerfully to invite, by this liberal arrangement, even more trade than both the great western and southern railways, if they could be compelled by the spirit of monopoly to terminate there. The trade of Petersburg, as now limited, is offered greater increase from the adoption of the whole scheme, than that of any other town—but only upon the condition that the passage of commodities shall be made as free as possible to and from each of the six inlets and outlets by railways, canal and river, that would there centre. However reluctantly, commercial jealousy and narrow minded cupidity *must* yield to this desired freedom of passage. It is fortunate for the welfare of Petersburg that she cannot refuse to other markets the main benefits of this free passage, even if desirous to refuse. If free passage through the town is denied, it is perfectly easy for the southern, western and northern railways to unite with the Appomattox canal above the comporation limits, and for the western railway in like manner to be continued, and on the same ridge too, to James River. Petersburg will have to choose between the immense benefit of all these lines of trade, meeting at a common centre within her limits—and the loss that would be caused by their passing by, to other destinations.

The share of Richmond of the increase of trade brought by these improvements, would be nearly all the products from the remote south-west that would be emptied into the river route at Lynchburg, and all that would be attracted through Petersburg—together with supplying in exchange or return all the foreign merchandize required for the same, or even a more extensive back country.

The distant travel would be divided principally between Richmond and Petersburg, much the larger part however seeking Richmond. Though the profit of carrying travellers is of immense importance to railway companies, their passage through any town is of very little advantage to it, unless they stop for purposes of trade. Therefore, though the adoption of the southern ridge route would keep from Lynchburg and Farmville all the travel not destined for those towns, they would lose nothing by it worth consideration. If the main line, in spite of local obstacles, was made to pass directly through these towns, the long travel would yield to them no benefit, if permitted a free passage—and if taxed by detention, would only give a little profit to tavern-keepers, hack-drivers, and porters. The commodities for which these towns would be the best or most convenient markets, would seek them as certainly by the branches, as the main railway route, if that was changed so as to pass directly through both.

If the railway from Farmville to Richmond should be made, in addition to the other lines, it will not affect the distribution of trade, nor materially that of travel. But by dividing the travel to Richmond between two railways, that one could as well convey, the receipts and profits of both would be diminished—to the great loss, certainly, of the southern line, and to the absolute ruin of the

northern, the income of that being from travel almost exclusively.

It is unnecessary to add to these observations, by considering the two other railways recommended by the Convention of Charlotte—because neither is demanded by any interest considerable enough to make the construction probable. The one from Farmville to Petersburg, besides being far more expensive to construct, and to use, owing to the more hilly location, would be so much nearer the Appomattox that it would accommodate a smaller producing country, and of course take less trade, and yield less profit, then the route proposed on the ridge, with the branch to Farmville which either scheme offers: and Farmville can suffer no loss or inconvenience by the preference of the ridge route, except the adding 20 miles to the small amount of travel passing direct between that town and Petersburg. No commodities, except in rare cases, would pass the whole distance by either route, because the Appomattox navigation when improved and facilitated, will be far cheaper than either. As to the railway from Farmville to Lynchburg, as an extension of the northern ridge route from Richmond, it will never be executed in the manner recommended by the convention. If, constructed at all, it will be in furtherance of the interests of Richmond rather than those of Farmville—and therefore, (as well as for a better location,) will be made on the *north* instead of the *south* side of the Appomattox. The choice between the southern and northern ridge routes, east of Farmville, for the great western railway, or the greater success of either, if both are used, will determine which will be the proper route to be continued to the south-west by Lynchburg. If the best is chosen for yielding profit on the stock, and for general accommodation and use, I doubt not that it will be south of the Appomattox—and whatever may be its particular location, it will suit the convenience and interest of Farmville better than any she can obtain by leaguing with Richmond. If able to get the road to Lynchburg, at all, Richmond, will certainly be enabled to prescribe the the route: and no interest, public or separate, save that of Farmville, could require a railway, brought from Richmond through Cumberland, to diverge to the south of the Appomattox, to reach Lynchburg. A branch from the nothern ridge route (as proposed in the Convention by the Richmond Delegation,) will be all that Farmville can obtain. In this alliance of Farmville with Richmond, the latter town can, and will, take the "lion's share" of the spoil.

R. N.

September 11*th*, 1836.

For the Farmers' Register.

ROUGH NOTES UPON SOME OF THE AGRICULTURAL IMPROVEMENTS OF CHARLOTTE, AND THE ADJACENT COUNTIES.

Charlotte Court House, Sept. 5th, 1636.

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A most important system of improvement, both for private and public interests, is in the course of execution in this part of the country. This is the supplying water-power to mills by means of canals, instead of the ponds which (as elsewhere in lower Virginia,) have long served that purpose. One result of this charge is the laying dry, and cultivating the lands heretofore covered by these ponds. A large proportion of the mill ponds in Charlotte have already been thus laid dry, and in every case, the canal has furnished a better and more permanent water-power. For the comparatively trivial expense of cutting a side canal, on a level, leading from the head of the pond to the water wheel, there has been gained for cultivation, in every case, a body of greater or less extent of very rich soil; and a relief from the always impending dangers, and enormous losses, of broken dams, from floods. But the greatest benefit which may be expected from the general adoption of this plan, is the removal of the greatest cause of sickness which has ever afflicted lower and middle Virginia. I have long been of the opinion that the diseases and deaths produced by the mill ponds of this country were evils so great, that they were not compensated by all the profits and conveniences of grinding meal by these means: and that even if we had to resort to horse or hand-mills, to obtain meal, that it would be a great public benefit if the dam of every *pond-mill* in the country was thrown down, and, no new ones permitted to be constructed. But luckily, there is no such loss to be encountered by millers, nor any inconvenience caused to their customers. Though some mill ponds still remain in Charlotte, to poison the air and people, I was told that there was not a doubt left of healthiness having been already greatly promoted by the drainings which had been made. Still the improvement has been very slow in extending—and it is owing to the *fortunate* occurrence of some tremendous floods that have swept away dams that were deemed the most secure, that many have been induced to accept the benefit of canals. I found John P. Dupuy esq: in Nottoway, engaged in constructing a canal to his mill, in consequence of one of these fortunate calamities—and there heard of another having been successfully constructed in his neighborhood. One, still earlier made, and which was described at p. 579 vol. II. Farmers' Register, has been tested by time, and found to answer entirely the expectations of its owner.

One of these ponds on Wardsfork, (and there were formerly 4 other mill ponds on that stream, within the length of 8 miles, of which two still remain,) belonging to Henry A. Watkins esq. covered 100 acres of land so valuable that he was offered by an adjoining proprietor, and refused, $200 per acre for a part of it, after its being drained. From 15 acres of the same, he once sold as much good tobacco as amounted to $1500, exclusive of the "cullings." If it was possible to estimate the amount of the suffering and loss, in deaths, sickness, and the consequent hereditary feebleness of constitution, of the generations that lived near this, any other large and shallow pond, it would present an awful exhibition of the carelessness with which we throw away the health and lives of many, for the *erroneously* supposed gain of a few. Yet the mill ponds of Charlotte were trifling evils compared to those which are so thickly scattered throughout the lower and more level country. Very few here are one third of the size of the one above mentioned. In the lower counties, very many are much larger. The pond of Tabb's Mill in Dinwiddie, now drained and cultivated, former-

ly covered 1200 acres: and several in Prince George and Surry cover from 300, to upwards of 400 acres each. In addition, these very large ponds are worth but little as water power—and in the opinion of even the owners, must do much more harm than good. But the little benefit of each pond goes to one person, and the sickness is generally divided among his family and many others. The land forming the bottom of the pond also generally does not belong to him who has the legal right to keep it worthless by its being covered by water; and therefore *he* has no interest in laying land dry, that would revert to the possession of others. This is one of the most stupid and worst parts of our legal policy.

The Wardsfork lands are the slopes and hillsides which lie adjacent, and descend towards that stream. There is very little extent of lowground on that stream—and the good land and good farming of Wardsfork, both of which are deservedly celebrated, are to be found on this generally steep and broken surface. The soil is mostly of red clay loam of moderate tenacity, and though of paler color, and of inferior quality, these lands are much like those of the South West Mountains. The surface of the Wardsfork lands is even more steep and broken. The soil was originally fertile, and when greatly impoverished and galled, as nearly the whole body has been, may be brought back to a productive state by means comparatively easy. Gypsum on clover greatly aids this particular course of improvement, and is very beneficial on all these lands, on corn and tobacco, but (as elsewhere) especially on clover. The dearness of this manure, caused by its long transportation, offers at present the greatest obstacle to the profitable improvement of the lands.

The distance from market, and the great expense of transportation, causes tobacco, here as in all the adjacent country, to be the almost sole crop for sale. This culture, requiring the richest land, is not thrown in the same rotation with corn, which is made on the poorer parts of every farm. The rotation of the tobacco land, usual on the best managed farms, is, 1. Tobacco, 2. Wheat, 3. and 4. Clover not grazed, or mowed—or, at most, but to a small extent. The other is 1. Clover, 2. Oats, 3 and 4. Clover. Sometimes there is one year less of clover, thus making either of the above a three, instead of a four-shift rotation. Mr. Watkins, who has had four shifts both for his tobacco and corn rotations, is going to have only three for the corn, in future, as he thinks that giving the benefit of gypsum *regularly*, will amply compensate for reducing the *manuring by clover* to half the amount, heretofore given on his highly improved and well cultivated farm. He has proved by long experience, (in one field as long as 30 years,) that by using gypsum on clover every year, and leaving all the clover to improve the land, that it will continue to get richer under the above four-shift rotation, without any other manure whatever. His tobacco on the piece so treated for 30 years is always the best of his generally very fine crops: and the present grade of productiveness of this piece, he is certain, is above that with which the soil was originally endowed by nature, and which had been greatly reduced by cultivation, before his course of treatment was begun. He has also found this very important result—that the gypsum, though repeated so often, and for so many years, has not ceased to be operative; nor is it known, that its later effects are lessened. I hope that the details of this very interesting part of Mr. Watkins' management will be given by him for publication, and therefore I will say no more.

The practice of suckering corn has been abandoned for two years by both Mr. Thomas E. Watkins and by Mr. Richard I. Gaines, upon the grounds presented in a communication to the Farmers' Register, at p. 685 vol. I. Both of these gentlemen are perfectly satisfied that they gain both in grain and forage by omitting this usual and troublesome part of corn culture. Mr. Watkins thinks that not more than one-fifth of all his suckers fail to produce ears; and the ears which they bring are generally perfect in form, and similar to those on the main stalks. I had supposed that they would be mostly produced on the tops, and be such imperfect ears as late suckers (left by neglect) often show.

I saw a piece of low-ground (on Ward's Fork) belonging to, and reclaimed by John F. Edmunds in so perfect a manner, that it was admitted to be by the gentleman who pointed it out, the most productive land known. But the crop of corn now on it is very much below what the soil is capable of producing, owing to the unprecedented floods which have this year damaged that, and ruined the crops of other low-lands less judiciously managed and secured.

With all my confidence in the several gentlemen with whom I conversed, it would have been difficult to believe that nearly all the lands on Ward's Fork, including the richest, (except J. F. Edmunds' farm, which he cleared himself, and has never lost its virgin fertility,) was at some former time, not only worn to poverty, but so washed as to exhibit numerous galls every where. It is difficult to imagine such a state of things, where the aspect is now so different. But I saw some land the culture of which had continued to be as careless and exhausting as *all* had been formerly, and of which the soil and surface were similar to the best lands; and here the poverty, and array of galls, were fully equal to any thing I had heard of on the other lands, and such as I would have expected in my own poorer country, wherever the surface is much broken, and the farming bad.

The removing the worms from the growing tobacco is a very troublesome job, and to which there is no end so long as the plant continues to grow. The fly lays eggs by thousands, which hatch speedily, and the worms begin to devour the leaves as soon as they escape from the shell, and when so small as to be observed with difficulty. Of course their destruction requires continual attention, and the handling and examination of every leaf in the field. The parent fly is large, and may be easily killed in numbers, as it is attracted by the stinking flowers of the Jamestown weed, and of gourd vines. If a few only of these baits were permitted to stand on a farm, at one place only, and the tobacco flies were there watched for at twilight, when they come abroad, they might be easily knocked down with paddles by little boys. This is often done, more for amusement than for its use; but not as a regular and general procedure, which alone can make it effectual. Every female fly destroyed, may prevent the having to kill some hundreds, or perhaps some thousands of its pro-

geny. I asked, but could not learn, whether any one had traced the tobacco worm through its middle transformation, so as to know what was its appearance in its dormant state, previous to its taking wing. This might be easily learned by observation: and perhaps it would be found that in that state, it was familiar to our view, but never regarded because not known to be the enemy in question. But as the worm does not make a cocoon on the tobacco plant, and cannot move elsewhere for that purpose, I infer that it buries itself in the earth—and if so, it could not be easily found in numbers.

The high prices of lands, in Charlotte and the adjacent parts of Prince Edward and Nottoway, both of the best and the inferior grades, alone would furnish sufficient proof of the general industry and economy of the people. The best improved Wardsfork farms, 80 to 90 miles from a tide water market, and 30 to 35 from Farmville, their usual place of sale, would sell at $20 the acre. The poorer and generally much worse managed lands seen in passing from Nottoway Court House to Charlotte, vary in price from $12 to 8, few farms being below the latter estimate, unless greatly injured, or originally of the poorest quality. All are hilly, and difficult to cultivate; and yet the prices are nearly or quite double what lands of like quality would sell for within a few miles of tide water.

This part of Virginia has derived, and indeed is still obtaining, immense returns from tobacco culture. But it is questioned by many of those farmers who have had good shares of these rewards, whether this culture is not altogether adverse to, if not incompatable with good and improving farming. It may be readily admitted that such is the fact, when tobacco occupies so large a part of the farm as is usual. But if confined to smaller spaces, I know no reason why tobacco—a *green crop*, and the one which gives the cleanest, and most admirable preparation for wheat—may not form a valuable part of a well arranged, improving, and profitable rotation. The abuse is, that the crops of tobacco receive *all* the manure of every farm, and generally also occupy every spot that still preserves a large share of natural fertility. To give all the manure to a crop which returns none, and to deny to the poorer corn lands at the same time any other sufficient means of improvement, is necessarily a land-starving system, and which, though it may give large present returns, must eventually impoverish those who cultivate the land so treated.

The ridges, and other poorer soils, so far as I could learn, are very little benefited by gypsum, and of course are deprived of that great means for increasing fertility. I could learn of but very few trials on such lands. If I may venture to suggest new practices for the profit of a region to which I am so much a stranger, I would advise the adoption of sheep farms, on a large scale, with permanent, or long continued pastures—and mulberry and silk culture. Both these would suit well on the same land, and both would improve the soil by rest from both the exhaustion and the washing caused by the use of the plough. Sheep farming has never been fairly tried in Virginia, because it cannot be done on a small scale, nor on farms of which every field is frequently and generally in tillage.

————, *Sept. 8th.*

Lime is the manure most wanted for all these poorer natural soils: but with such long and expensive transportation, any considerable use of this manure is scarcely to be hoped for. The better improvement of the Roanoke and the Appomattox, and the construction of railways, may possibly yet place this greatest resource within the farmer's reach: "*provided always*," that the companies owning these improvements may acquire and exercise more common sense than any have yet exhibited, and may discover that the ultimate profits from tolls would be increased, by *encouraging*, instead of *prohibiting*, by the rate of the tax, the transportation and use of permanent manures. Under all the existing discouragements from long and expensive carriage, I heard of two very intelligent, zealous, and successful practical farmers, who have commenced the use of lime to a limited extent, and who are well pleased with the results. One, of whom I only heard indirectly, and whom therefore it might be improper to refer to more particularly, uses stone-lime (from Maine) carried up the Appomattox nearly to the head of navigation, and paying a toll of 25 cents the cask, (three bushels of stone.) This was used in compost; and it was said that the result was at least not discouraging. The other is Dr. A. Campbell, of Nottoway, whose farm is 45 miles from Petersburg, and who draws oyster shells that distance in the wagons which bring his crops to market, whenever they would otherwise return empty. He also has used his lime in compost, and in different modes—and though never at a heavier rate than 25 bushels of shells to the acre, the benefits have been so manifest, and considerable, that he will continue thus to purchase and draw shells, even if at more than double the price of 75 cents the hogshead, (18 bushels,) at which they are sometimes obtained. The other ingredients of the compost, of which the oyster shell lime formed a part, were leaves from oak woods, and earth scraped from around negro quarters, but which did not contain any recent ashes, as those had been previously and carefully saved, and used separately. These scrapings were of but moderate richness, compared to most similar situations where less care had been used to secure and remove the richer accumulations. The compost heap, so formed, was exclusively used to dress one part (I think a third) of the tobacco crop, while the stable manure, and the farm yard manure separately applied, covered the balance of the field. The effects seen on that (the first) crop were greatest from the stable manure, next from the compost, and least from the farm or cattle yard manure. But it should be remembered that the early effects of lime are far from being the best. The compost was also used not long after it had been made; and Puvis says that the longer compost heaps of lime and earth remain before being used, the better the effect as manure. In this application, 25 bushels of shells were used to the acre.

Another mode by which compost was made by Dr. C. presents facts well worth the notice of the chemist, as well as of the farmer. Two casks of stone lime, (about 6 bushels of the stone, before slaking,) late in March, were mixed with the contents of the winter cattle yard, where 35 to 40 head of cattle had been kept, and properly littered with

cornstalks, &c. The stalks being generally large, and the quantity great, compared to the treading and animal matter received, they were but little broken. On this account, the whole yard was chopped over with sharp hilling-hoes, by which the stalks were reduced to pieces of not more than 8 inches long. The whole were then heaped, as usual, to be brought by fermentation to a state fit for the tobacco land. The heap was examined at several times, and the heat found to be more moderate than usual: and when cut down for use, at a later period of the spring, the manure was in the most perfect condition—that soft "cheesy" state, which English farmers call "spit dung," from the ease with which a spade cuts into the heap—and there was not a spot fire-fanged, or showing that white mould which is evidence of violent and destructive fermentation.

Now, to mix fresh lime with highly putrescent matter, (as was the animal part of this mass,) seems contrary to all proper deductions from chemical laws. Caustic lime, in sufficient quantity, rapidly decomposes and consumes animal or other very putrescent matter—and fermentation alone, also decomposes it, and injures its value, or lessens its amount. Here both these different decomposing powers were suffered to act together, and the combined effects seem to have been highly beneficial. Can it be that two decomposing powers, acting differently, serve to counteract, and lessen the violence of each other, so that the joint effect of both is less hurtful, or dangerous, than would be the use of either one alone? It should be observed that in this case, the proportion of lime to the whole mass was very small.

The making of *hills* for planting tobacco, which heretofore has been universally considered indispensable, is now abandoned by some planters: in time, this practice, though more tenaciously adhered to, will follow that of hilling corn, which formerly was universal, and deemed absolutely necessary, and which is disappearing wherever reason and experiment are allowed to operate.

It was a matter both of surprise and regret for me to hear, on Wardsfork, that the value of graduated ditches and beds, to prevent the washing by rains on hilly lands, was estimated less highly than formerly, by some of those who used them. But, upon observation of the existing practice, and conversing with several who entertained different opinions concerning the proper modes, and effects, I had no reason to think less highly than before of hill-side ditches, or beds, as described and advocated by several writers in the first volume of the Farmers' Register. The lines for these ditches are often carelessly and incorrectly marked off—and in consequence, may do more harm than good. Besides, none that I saw, even where most effectual and most approved, seemed to me large enough to resist the heaviest floods from falling rain. Another cause of their being considered less important, is, that after the land acquires a good cover of clover, and it has been ploughed under, the soil resists washing so well, that the farmer is tempted to dispense with a practice, which, however serviceable, is certainly attended with much trouble, and requires more skill and care than most overseers can or will exercise. Though there is far less of hilly land in the lower country, yet its sub-soil is of less worth, and therefore more disposed to be washed into gulleys: and for that reason, I think that this improvement is more wanting there, than on the more hilly lands, but better soils of Charlotte. I know, from experience, that horizontal or graduated ploughing, in narrow beds, without the ditches, in the lower country, causes washing to be even more destructive than before.

I am sensible that observations made as hastily, and therefore as imperfectly as these, are in themselves but of little value, even if correct; and perhaps are incorrect, owing to the haste, and peculiar disadvantages under which the writer was compelled to make and note his observations. But if these remarks have ever so little worth, as conveying information *directly*, it is hoped that *indirectly*, they will promote that end far better. It has been my object to draw forth from the individuals whose labors are referred to, as well as others, more full and correct statements on these and other interesting subjects relating to agriculture; and if I have made mistaken and erroneous statements, the corrections can be easily afforded, together with much more of the interesting and instructive matter, which very many farmers of this region can well furnish.

A GLEANER.

For the Farmers' Register.

IMPROVEMENT OF THE APPOMATTOX RIVER.

The Appomattox from Farmville to Petersburg, is but little wider than a first rate canal. It has bold high banks, and a very moderate fall, not exceeding an average of one and a half feet to the mile, from Farmville, to the head of the canal, near Petersburg, a distance by the river of ninety-six miles. The mode of improvement adopted is the lock and dam; the effect of which, when completed, will be to render the bed of the river a perfect canal, with no more lockage than would be necessary in a lateral canal of the same length—and althongh the navigation of this canal, made of the bed of the river, will be liable to the difficulties arising from the freshets in the stream, yet these disadvantages will be more than counterbalanced by the cheapness and security of the improvements, compared to a lateral canal. Lateral canals are liable to frequent breaches in the numerous embankments, bridges, arches, and tunnels, and filling with mud, settling from the water flowing into the canal, and from the hill sides. The bed of the river is cleared out by the natural process of the strong currents which occur in freshets—and it is easy so to secure the locks and dams as to render them safe against any rise of water. The tow path of a canal will be wanting to this improvement; but steam which is cheaper and better, can be used instead of any other propelling power; and it has been generally considered that steam power would be injurious to canals. The locks are constructing of such a size as to admit of the use of boats of much larger size, than those at present used, and with a view to the use of such steamboats as are now used with great advantage on the Connecticut River, both for passengers, and for towing freight boats. The work is progressing as rapidly as circumstances will permit, and will probably be so far completed in eighteen months as to realize great advantages to the trade of the river, as well as to the farmers who reside

in the vicinity of the river, yet who have not heretofore used it, on account of the imperfect state of the navigation. It is calculated that freight will be reduced to half the present rates, as soon as the works are complete. As far as the locks and dams have been completed, the improvement meets the most sanguine expectations, and affords a deep and safe navigation at all seasons. It had been feared by the land holders on the river, that the mode of improvement adopted, would prove injurious to the lands; but it has not been found necessara to make any dam so high as to overflow or injure the low grounds, and the experience of near a century has proved that dams across this stream do not cause it to fill with sand or mud; as collections in the bed are swept out by the frequent currents, and deposited on the low grounds bordering the stream. It is believed that the apprehensions of land holders are generally quieted on the subject of injury, and that the improvement is a popular one.

These views and statements are offered to the public—and particularly to those interested—by one whose duty requires him to pay some attention to the subject.

E.

LIMING AND DRAINING.

To the Editor of the Farmers' Register.

Fairfax County, September 6th, 1836.

Your pamphlet upon the use and value of calcareous manures is a public benefaction, in as much as it promises individual wealth. My corn crop, from its use, is far better than I expected, and I am now burning shells for 110 acres of fallow, and if I am not deceived, the difference in the crop will more than pay the expense. Be this however as it may, I shall plough no more land than I can lime. It may be well to remark that no wet land should be limed until *well drained*, for upon this *materially* hangs the result. Much has been said and written upon draining: but one from the dead would not convince ten men in this county so far as to move them to action. All the flat lands or lowgrounds of this county have a tight impervious pan near the surface, which holds the water that falls upon it, and subjects it to regular and perpetual deterioration from the action of frost and sun.

I could name farms all around me upon which the manner of cultivation has been much improved, yet from having neglected to drain their land, not more than one third is now made on it which was made 40 years ago. I blush sir when I say that I believe I have defeated my own purpose in agriculture by seeking to force nature. She will not be forced. Man cannot force her to grow Indian corn and wheat where she has resolved by unchanging law that the bullrush, wild oat, and corn grass shall grow.* Let the cultivator watch the will and purpose of nature: a dry soil, vegetable matter and lime have made 100 bushels of corn to the acre, and I leave it to your readers to say what a wet one has produced.

Have any of your correspondents ever seeded spring wheat—and if so what was the result?

Who has cultivated the same land in corn for ten years and what were the comparative crops? My small drains are so much deranged by the corn crop, that I wish to have my flat lands entirely exempted from the crop.

X. Y. Z.

From the Tenessee Farmer.

THE DIFFERENCE OF EXHAUSTING AND ENRICHING TILLAGE.

Grant me space in your columns to communicate to the public the results of my experience in farming. I have been trying to farm for twenty years, nineteen of which, I persisted in my own course, unaided by agricultural papers, or by any systematic rule; consequently my improvements were small. The laat year I subscribed for the Tennessee Farmer, and searched, read and examined it, and other authors—entirely turning my attention to *book farming*: and I freely acknowledged, that the improvements I have made during that period, have far exceeded those of the nineteen previous years; and I return you my sincere thanks for your aid—though I have not acquired all my knowledge from your paper alone, yet I have been materially benefited by it, inasmuch as it begat in me a spirit of enterprise and a desire for improvement. As I have derived great benefit from the knowledge and experience of others, I think it my duty in return to furnish them with the results of my experience, soliciting an enlightened community to pursue an improved and systematic course of agriculture, assuring them, that they will find the profits resulting therefrom amply sufficient to compensate them for their labor and toil. I must, however, confine my remarks to a few only of my experiments.

In the year 1822, I purchased a farm of 354 acres, 125 of which was cleared. The land was once good second-rate land, but was now completely worn out. Being greatly indebted for my farm, the idea of improving the cleared land never entered into my mind; but I set to work opening fresh land, until I had enlarged my cleared land to 225 acres: this I continued to cultivate in corn, until a part of it was so far exhausted, that I could no longer cultivate this crop profitably.

In the spring of 1833, I planted two acres of my land in corn, (this two acres was about equal to the balance of my cleared land) on which I raised 20 bushels to the acre; the corn was worth 25 cents per bushels, amounting to $10; the cost of cultivating was $7, which left me a profit of $3. The following year it remained uncultivated. The next fall I sowed it in wheat. The following spring I hauled out ten tons of good stable manure, which I spread over one acre. At harvest I gathered from the two acres nineteen bushels of good wheat, which brought me the sum of $16,

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* We must express our entire dissent to the doctrine here broadly stated. It certainly is impossible to produce profitably the vegetables which require a dry soil, on land imperfectly drained. But there are not many cases (in this country) in which wet land (not subject to inundation by tide or floods,) may not be perfectly drained: and when that is done, nature readily yields to the new state of things, and will herself, if man does not, eradicate the bullrushes and other products of watery lands, and substitute them by grasses which flourish on dry soils.—Ed.

62½. The cost of the crop, I estimated at $6, 62½. The manure say was worth $10, which brings the account out even. In the spring I sowed orchard grass and clover seed. The succeeding spring I sowed over the grass a quantity of plaster and ashes. The result was—from the manured acre I mowed 5 loads of hay; from the one not manured, I mowed 2 loads; each load was worth at least $5; consequently, the manured acre yielded me $25 worth of hay; the unmanured acre only $10 worth. The cost of harvesting the manured acre was $1 50; plaster, &c., 50 cents, making $2. Profit, 5 loads of hay at $5 per load, $25, leaving a clear profit of $23 on the manured acre. The cost of harvesting the unmanured acre was 75 cents; plaster, &c., 50 cents; making $1 25. Profit, 2 loads of hay, at $5 per load, $10; clear profit on this acre only $8 75. Difference of profit in one year in favor of the manured acre, $14 25.

I have this year made three experiments in my wheat field to ascertain what kind of manure is best suited for wheat. I applied barn manure to one spot, barn manure and lime mixed on another spot, and on a third spot, I applied lime alone. I have tried other experiments with barn manure, and from my experience I am fully persuaded, that, lime or calcareous manure is the best for wheat. I am about trying the efficacy of clover and buckwheat, ploughed down, as a manure. I intend sowing wheat in the clover, and rye in the buckwheat field.

To furnish putrescent, or animal manures for all our worn-out fields would require immense labor and expense. If lime will answer the same purpose—and I believe it will—* we should not much longer complain of poor land; for, in this country, we have an abundance of the best lime-stone and timber—and now, all that is wanting is knowledge and industry in the preparation and application of it to our lands; in both of these particulars, we must admit we are sadly deficient. We have but two alternatives, either to improve our lands, or to sell and go westward, where Providence has furnished a richer soil.

Suppose, for a moment, my whole farm to be as rich and as well cultivated as that one acre, (and I might have had it so if I had began to improve when I first purchased,) what would be the profit of it yearly? If on that one acre I make a profit of only $30, (and I am satisfied I will make more when the second crop is taken) my whole 225 acres would then yield me a profit of $6750, a sum greater than I can sell the farm for, and more than I have ever made on it since I owned it.

But suppose a clover crop to be twice as valuable as any other, I would still have $3375. I will now deduct one-half of that amount for pasture land and failure of crops, &c., and I would still have a profit of $1687. I will now suppose that $687 will be required to defray the expenses of the farm, I would still have a yearly profit of $1000.

I will now give you a short account of my profit and loss for a few years.

Now being able to work myself, and having no force of my own, I am necessarily compelled to have my work done by hired hands. After I became unable to labor myself, I found that my hired hands were sinking money for me. I then resolved to keep a strict account of all my farming operations. At the end of the first year, I found, on balancing the account, that I was $163 in debt. I examined the account, and endeavored to ascertain, if possible, where the fault lay. I satisfied myself sufficiently to make a second trial; accordingly, I dismissed my manager and some of the hands, and employed a more faithful and industrious manager, determined, if posssible, to profit by past experience. At the end of the next year, when my books were compared, I found I had made a profit of $93, a sum not half sufficient to pay the interest of the money I had laid out. A third trial is now going on, with the same manager, but more immediately under my own supervision, aided by all the knowledge I have been able to acquire from agricultural papers and other sources. I cannot yet make a fair estimate of the profits, but from present appearances, I think I shall realize near $500. Is it not astonishing to see the number of persons who subsist by farming entirely, still continue the old land-killing system, when such profitable results are to be expected from an improved mode of tillage?

Farming is both a pleasant and profitable employment, if properly carried on. The experience of thousands have taught us this, and any thing I could say, would not make it more clear.

I have been asked by some, "what use have we for rail roads? our population can consume all the surplus which we now have." I answer, if we had rail roads, the amount would be increased to a vast extent; our interest would become more united, and the danger of a disunion proportionably lessened.

A few words more to my brethren of the plough in East Tennessee. From the great irregularity of our surface, we have a great diversity of soils and climate, requiring the greatest agricultural skill, to ensure its full developements. Clover and lime, judiciously used, as a manure, will produce beneficial results, far beyond the expectation of those who have never tried them. Arouse then, brethren, to the improvement of your lands, and be assured, you will reap a reward, amply sufficient to compensate you for your labor.

WM. PEEPLES.

From the Register.

TO CURE THE BIG HEAD IN HORSES.

Take one quart of hog's lard, one quart of tar, and one pound of sulphur or brimstone; put all together in a pot over a slow fire, and boil it till the brimstone disappears; then make a mop on a strong stick, and rub the horse's head from the eyes to the nostrils once a day, until the mixture is all gone, and it will make a cure. I have tried one horse and did cure him sound and well. If you think the receipt worthy your attention, you can put it in your Register, with my name.

RICHARD B. HARRISON.

Dallas Co., Ala, April 19, 1836.

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* We would caution friend Peeples against an exclusive reliance on lime for manure, valuable as it unquestionably is. Nothing can justify the neglect of animal and vegetable manures, without the application of which, the permanent fertility of land cannot be obtained—but when united with the use of lime, the effect will no doubt equal his expectation: but in both cases it must not be forgotten, that to insure profitable results judicious tillage is indispensable.—Ed. Ten. Far.

THE "WATERLOO CÆSAREAN EVERGREEN CABBAGE"—ALIAS COW CABBAGE OF JERSEY.

The Farmer and Gardener of Sept. 13, introduces an account of this cabbage (taken from the last No. of the Horticultural Register of Boston,) in the following manner.

"We have a few hundred of these plants growing at our little establishment; but as the season has been inauspicious, and they have not had a fair chance for luxuriant growth, we cannot say what may be the result of our experiment. We obtained the seed of Robert Sinclair, jr. at $5 a pound, those in England are, or were, held at $5 for 20 seed. The next season we shall take time by the forelock, and give the article a more fair and perfect trial. If it should prove by proper test to realize a moiety of what has been said of it, it will certainly produce a new era in agricultural pursuits; but as the venders of the seed of new things, are not always the most scrupulous in pronouncing their eulogies on their virtues, time and actual cultivation are necessary in order that their capacities may be properly demonstrated.

In the more southern portions of our country, if this cabbage should prove as valuable as some of its encomiasts have stated it to be, it will, indeed, be a blessing. But of its properties after we have had time to form a correct practical opinion, we shall speak more fully."

Though the exaggerations of the English account given in the Horticultural Register, are partly neutralized by the remarks of its conductor, still there is some danger that there may spring up and spread over our land a *cow cabbage mania*, such as at different times has been excited by millet, Cobbett's Russian turnips, and Gama Grass. For this reason as well as for the amusement of our readers, we republish (from the Aug. No. of Loudon's Gardeners' Magazine,) this most impudent puff, and shameless yet very successful deception. The nostrums recommended by agricultural quacks and patent venders, like those of the medical quacks, are generally the more successful in proportion to the enormity of the pretension and falsehood.

"An individual in England having shown a specimen of this variety of what is properly a borecole, to Mr. Coke of Holkham, that gentleman expressed surprise at its size, &c. Advantages was taken of this to puff off, as the phrase is, this vegetable under a new name; viz. the Waterloo Cæsarean evergreen cow cabbage, and to sell the seeds at the rate of a sovereign for a packet containing twenty seeds. The following is an extract from the advertisement:—

'Patronised by His Majesty. Wonderful production of nature! Waterloo Cæsarean evergreen cow cabbage, of recent discoveey, unequaled in affording the most interesting and desirable results to the farmer, grazier, and manufacturer. This singular and extraordinary species of cabbage, almost unknown in England till introduced by the persevering efforts of Mr. Fullard, three years since, grows from nine to twelve feet high, and from fifteen to twenty feet in circumference. Five of these stupendaus cabbages, now raised to the greatest perfection in quality as well as size, have been repeatedly found, by proper management, an ample allowance of food for one hundred sheep, or ten cows. per day: and the nutrition thence supplied by this delicious vegetable will (as experience has already abundantly demonstrated) speedily produce the most surprising improvement in the *growth* and *utility* of every description of cattle. As an evidence of the beneficial tendency of this cabbage, Mr. F. has the great pleasure and satisfaction of saying, that sheep fed upon it have been found to produce wool of the finest silken texture, twenty-five inches long; a circumstance which cannot fail immediately to claim the utmost attention and admiration: as such, the cultivator of these cabbages will not only realize pecuniary profit beyond any previous experience, but the manufacturer will also obtain a material superior to any heretofore produced by the most profitable speculation, the general and extensive demand for which must exceed all present calculation. The commerce of the country, as well as the interest and pleasure of the community at large, will likewise be greatly, if not incalculably, enhanced by the cultivation and use of this improved vegetable production. This Waterloo Cæsarean cow cabbage has been pronounced by the father of the agriculturists, whom, from his well known experience, we are all bound to believe, to be the greatest wonder that ever appeared in the vegetable kingdom. It was shown to that very highly esteemed and truly respectible gentleman, T. W. Coke, Esq., Holkham Hall, Norfolk, in October last, when he immediately said—'*Mr. Fullard, you told me, three years ago, agriculturists were only half way advanced in improvement: this cabbage makes me say I am bound to believe you. I do say it is the greatest wonder the earth ever produced.*' Mr. Coke subsequently introduced several *dukes* and other *noblemen*, to the number of nine, to view this great production, all of whom expressed their astonishment, and engaged a part of the seed for use this year (1836.) These cabbages, if designed for use in the winter season, can, for convenience, as well as advantage to the grower, be then removed from the fields, and will serve to make handsome serpentine walks in gardens; or they will form a most excellent avenue for winter across a field; or, by setting them singly, will make a ground, that has not a tree in it, a park for winter, and may be given to the stock in spring. To obviate scepticism, and to afford the highest satisfaction and confidence as to the perfect rectitude of the statements here given, agriculturists, graziers, and all who feel an interest in the species of produce, are respectfully requested to apply to Mr. ——, wholesale perfumer, No. ——, ——, London, who will, with pleasure, exhibit speciments of the cabbage, and also wool of sheep fed with this vegetable production. Mr. —— is the sole agent in London for the Waterloo Cæsarean cow cabbage seed. All purchasers of it are particularly desired to sow it at the proper season (which is in July,) as stated in the directions which accompany the parcels, price 20s. each. The plants of this seed, unlike other vegetable produce for cattle, *never fail*, either numerically or in quality. A part of this seed has been engaged by His Majesty, and forwarded to Norfolk Farm, near Windsor, to be sown this season; and the production is already likewise patronised by most of the royal family. The Duke of Wellington, and the following gentleman, are a few only who have selected the seed for cultivation this year:—the Right Hon. —— Dymock, Champion of England; Robert Leeds, Esq., Surrey; Thomas Back, Esq., Wellesbro'; Joseph Cowen, Esq., Bladenburn; Sir William Folk, Norfolk; R. Preston, Esq., Barrister, Lincoln's Inn; —— Allington, Esq., Little Barford, near St. Neots; Edward Lindsell, Esq., Broon, near Biggleswade; Henry Walker, Esq., Corn Exchange; R. Sutton, Esq., Royal Exchange; —— Jesse, Esq., Hampton Court; Henry Hills, Esq., Allebury; Henry Handley, Esq., M. P., Lincolnshire; —— Perkins, Esq., proprietor of Islington Market; William Shield, Esq., Lincolnshire; Thomas Hudson, Esq., York; —— Hern, Esq., Bury St. Edmonds; —— Watkin, Esq., Windsor. It is desirable to remember, that these sweet vegetables, when boiled, are remarkably tender, and in flavor resemble asparagus. For the table, or culinary purposes, they will ever be highly appreciated. They grow in the form of a

cone, and from the thickness of their foliage, and being evergreen, they will be found ornamental to a garden. The plants, after two months' growth (say in September,) require to be set out at the distance of two yards and a half from each other. They will grow on soil of moderate richness; but their greatest perfection will require soil of good quality. At any subsequent period to their being thus transplanted, they may be removed to any other place where convenience or taste may suggest. All letters from the country, requiring a packet of seed to be forwarded, must (to be attended to) contain a sovereign, or an order for the payment in London; and it is requested the name and address, where it is to be sent, be legibly written. Caution:—Any packet sold at a less price than a sovereign, either in town or country, cannot be genuine. Observe, also, upon each packet the circular seal, with this inscription: '——, No. ——.' It is important to observe, that none of the genuine cow cabbage seed will be sold after the month of July, for sowing this year (1836.')

'*Further Particulars.*—In reference to the length of wool produced by sheep fed upon the new colossal vegetable, as described in this prospectus, the proprietor, Mr. Fullard, to prove the fact, has now a lamb-hog, one year old, to be *seen* at Mr. ——, No. ——, ——, where T. W. Coke, Esq., of Holkham Hall, paid a visit on Tuesday, the 14th instant; and, upon due examination of the said lamb-hog, he declared, in the presence of many witnesses, that he never before saw such a specimen of wool for *length* and *fine* quality. Mr. F. has already been awarded *nine* premiums, by the Agricultural Societies, for the *superiority* of his sheep and other cattle.

'(Signed) ——, No. ——, ,,

"The noise made by Cobbett's Locust was nothing to this. We are informed, on what we consider undoubted authority, that from 30 to 40 sovereigns a day were taken at the perfumer's shop referred to, for several months. The London seedsmen are regularly supplied with similar cow cabbage seed from Jersey; which is sold by retail, by Mr. Charlwood, at 1s. per ounce; an ounce, as we are informed by Mr. Cormick, containing about 5000 seeds, which would, of course, produce the wholesale perfumer £250 in ready money. As several gentlemen have called upon, and written to us respecting this cabbage, as they did about the time the *Gardener's Magazine* commenced, respecting Cobbett's Locust (see *Arb. Brit.*, p. 616,) we have thought it worth while to state the above; adding, that, as we know that our advice was not taken in regard to the locust, we doubt if it has deterred those who applied to us from purchasing the Cæsarean cabbage. The truth seems to be, that there is a portion of mankind who have a love for the marvellous to such an extent, as to become a disease which will have its course..... A correct estimate of the real merits of this cabbage, by Mr. Saunders of Jersey, who supplies the London trade with their seeds, was published in the *Gardener's Magazine* in 1829 (vol. v. p. 440.;) and it has also appeared in the *Encyclopædia of Agriculture*, 2d edit. p. 867."

A LONDON AUCTIONEER'S ADVERTISEMENT OF LANDS IN VIRGINIA.

[The following puff extraordinary, (taken from a late English paper,) furnishes another evidence of the system of fraud which is continued to be practiced in England, in the sale of mountain land in Virginia. As in a previous volume we commented at some length on these fraudulent sales, and as it would be to as little purpose again to endeavor to warn the dupes, we shall merely insert this advertisement, to amuse our readers in general, and to astonish those who may reside near the locality described, with the exalted character which their lands have acquired across the Atlantic.]

In the State of Virginia—A most important Estate for those of moderate means, and who would emigrate successfully.—Mr. George Robins is instructed to offer to public competition, at the auction mart, London, on Tuesday, the 9th of August, at twelve, in lots of 1000 and 2000 acres each. The Freehold Lands included in this important sale, extend to one hundred thousand acres, situate on the mighty waters of the great Ohio, in the commonwealth of Virginia—the neighborhood of rising towns, good markets, navigable rivers, and national turnpike roads. There is a direct communication by steam to New York, Orleans, Pittsburgh, Richmond, Baltimore, and Washington. Three vast rail roads have commenced, under the sanction of government, who have contributed fifteen millions of dollars towards the completion. In three short years they will be perfected. The lands are in the counties of Cabell, Harrison and Giles. They are fertile (almost beyond belief,) the soil adapted to the production of every thing that is useful. Industry and a little capital are alone wanting to render this one of the fairest agricultural portions of the globe, and in a climate, it must be remembered, remarkable for its salubrity and invigorating powers: besides which it may be called the land of promise, inasmuch as the mineral and fossil wealth is no where to be equalled, and iron, coal, lead, and salt are found in all directions in the greatest abundance. From the minerals on this property a source of commercial enterprize may be contemplated. It should be observed, in conclusion, that religious worship is unshackled, and there is a total absence of taxes. It may therefore be stated in great confidence, that this sale will secure to those of very limited means, wealth without risk; possessing the only essential requisites of industry and talent. A farmer having saved £100 or £200 from the wreck of his fortune here, will find at this sale, the opportunity to realise all his bright and early anticipations. It is not a speculation founded on theory—experience has demonstrated that it is a moral certainty; and consequently, a mechanic possessing £200 and upwards may confidently appear at this auspicious sale.

Particulars may be had at the Waterloo, Liverpool; the Manchester Times Office, at Manchester; the Hen and Chickens, at Birmingham; the Auction Mart; and at Mr. George Robins' Offices, in Covent Garden. The title is clear beyond the possibility of doubt."

ON RAISING TWO OR MORE SUCCESSIVE CROPS OF COCOONS IN EACH YEAR.

When any culture, or other business, is new in a particular country, and yet is rapidly spreading, and employing many heads to direct, as well as hands to execute, there are sufficient reasons why there should be many new discoveries, more important than any which a century had brought to light in countries differently situated. In such circumstances, each man engaged in the business is more or less a learner, and therefore necessarily an experimenter. Where all are

novices, he can find no where truths established by experience, or opinions (true or false) venerable from age. He is thrown upon his own resources, and compelled to exercise his own reason and inventive genius. The consequence is, that among many errors and losses, some new and useful truths are sure to be discovered—and these are speedily and extensively made known, by the universal prevailing desire to seek and profit by instruction on the subject. Hence it is, that new as silk culture is in this country, improvements have already been made, and questionable points have been brought into discussion, which had scarcely been thought of in Europe or Asia, where this business has been pursued, and to great extent, for centuries. Among these debated points, is the possibility of profitably rearing more than one crop of cocoons in a season. The affirmative has been maintained in this country—but not upon sufficient ground of facts and experience to command general assent.

But though in Europe, this question had before scarcely attracted any notice, it is from that quarter that we are now presented with valuable and convincing experiments, made as their projector and conductor evidently supposes, as to a subject entirely new. The importance which M. Loiseleur-Deslongchamps attaches to his discovery, is evinced in the title to his communication, (published in the *Annales de l'Agriculture Francaise*, for July, 1836,) which reads thus: "*New considerations upon the means of doubling, in France, the crops of silk, by making, each year, many rearings of silkworms,*" &c. His experiments were accurately conducted, and are clearly detailed; and they will serve to throw much light on, if not to remove all doubt from the subject. Passing over his more general and introductory observations, we proceed to translate what is material and useful. After stating the great amount of raw silk annually imported into France, and the necessity of supplying her manufactures from her own products, he proceeds thus:

"From the moment that I knew of the enormous quantity of raw silk that our manufacturers purchased from foreign countries, I had the idea that we might double the product of the material, in France, if, instead of a single crop of cocoons, it was possible to have many. But I sought in vain then, in the authors within my reach, what they had said upon this subject, I found nothing positive (*de bien positif*) in Boissier de Sauvages, in Dandolo, in M. Bonafous, and others, that I consulted. Sauvages indeed had made some attempts to preserve the eggs of silkworms beyond the ordinary time, by heaping a certain quantity together, and covering them with gum: but the trial had no success. Without explaining how multiplied hatchings were made in India, Dandolo and the author of the article "Ver à soie" in the *Nouveau Cours complet d'Agriculture*, say that in certain parts of that country, 12 crops of silk are made every year; but neither of them indicate in any manner the process necessary to procure this product. It was necessary then to seek how to arrive at it: besides, the difference of climate is so great, that there was no probability that what was practised in India, would be applicable to France.

"The first trial which I made to procure a second generation of worms was, by hatching a small packet of eggs laid during the same season, in July, 1823. Though kept exposed to the heat of the human body, from August 1, to the end of Septmeber, none were hatched: there came out not a single living worm—and after the two months of incubation, all the eggs were shrivelled and dried. It was necessary to have recourse to other means."

Thence supposing that exposure to the mild temperature of spring was necessary, after the cold of winter, M. Deslongchamp was led to believe—

"that if the eggs of the silkworm could bear, without injury, the temperature of an ice-house, it would be the sure and easy means of carrying on, every year, several successive rearings, and consequently of augmenting considerably the usual product of silk. In consequence, in the first days of March, 1834, I placed in the upper part of an ice-house, at the temperature of zero,* or at most, at but a degree higher, many little glass vessels, containing silkworm's eggs. My design was to withdraw them successively in the course of the spring and summer, so as to make hatchings and raisings that would succeed each other without interruption. In order to preserve my eggs from the great humidity which always prevails in ice-houses, I had the vials well stopped, and carefully sealed with wax..... On the following 3d of July, I withdrew one vial from the ice-house; and for fear lest too abrupt a transition from a temperature of one degree above freezing, to 17 or 18, (which was then the temperature of the open air at mid-day,) should occasion some damage to the eggs, I took them from the ice-house very early in the morning. Half an hour after, I placed the vial containing them in a cellar, where they remained for twenty-four hours: and at the end of that time, it was removed to the coldest part of my apartment. In short, I exposed the eggs to increased heat as gradually as possible, to the time when placed for incubation—which lasted 8 days, and by which, the hatching was obtained on July 17. I kept all the worms that left the eggs on that and the next day, and of them made a raising (*éducation*) which lasted a little more than 36 days, and from which I took away a suitable number of cocoons for a purpose of which I shall speak hereafter."

In the same manner, and with like precautions, a second hatching was produced on August 4th. Previously, experiments had been made by keeping the eggs altogether in a cellar: but the variation of temperature (from 6° to 9½°) was too great, to keep the living principle dormant, and thereby preserve it for future action.

"It will suffice to say, that in 1824, I made, successfully, five complete raisings of silkworms, at the following times.

"The first was the natural raising—that is to say, it was commenced May 10, with worms hatched some days after the opening of the leaves of the mulberry. The cocoons which it yielded, weighed, on an average, 34 grains each, and 220 made a pound.†

"The second raising, retarded by means of a temperature of 6°, (above freezing,) commenced May 29 to 30. The cocoons obtained, were weighed too late to estimate justly their true weight.

"In the third, again retarded by the same means, my worms were hatched June 20; and they made, from the thirty-fourth to the thirty-ninth day, cocoons of which 230 made a pound. The lightest of them weighed 30 grains, and the heaviest 53 grains.

* The Thermometer referred to in this piece, is the Centigrade, according to the scale of which *Zero* (0°) is the freezing, and 100° the boiling point.—Ed. Far. Reg.

† The French pound is heavier than ours by one tenth—92.64 of the former being equal to 100 lbs. avoirdupois.—Ed. Far. Reg.

"The fourth raising, on which I have sufficiently explained above, furnished cocoons which weighed much less than those of the three first, since 280 to 290 were required to make a pound.

"The product of the fifth was still more feeble, the cocoons being 350 to 360 to the pound.

"I shall resume my remarks upon the products of each of these five crops, made in 1824: but it is proper to mention, first, that after having completed them, with a success which I had scarcely dared to hope, I believed that I had made a discovery; and as I could not doubt the advantages which silk culture might derive from it, I hastened to publish it. I read, upon this subject, a memoir before a learned society: but to my great surprise, I was listened to with coldness. Indeed, so little sensation did my memoir produce in the audience, that it was plain that nobody had comprehended of what importance might be the proceeding, which I had announced.....

"However, notwithstanding the disregard of the public, I continued, the following year, my experiments and observations; and in the course of the spring and summer, I made 6 raisings, of which, one was natural, two retarded by the temperature of the cellar mentioned above, and the three last, by making use of the ice-house. These six crops gave (as the year before,) products more or less satisfactory: but having remarked that the first were much better than the last, I limited myself, the two following years, to making three raisings only, instead of five or six. In 1827, the first raising was begun April 18, and finished June 16; the second was from May 8, to June 30; and the last, commenced June 1, was entirely finished on July 15: so that in less than 90 days I obtained three crops of cocoons. All the raisings have been entirely effected without artificial heat—which of course prolonged the time."

The communication of M. Deslongchamps is marked to be continued in the August No. of the *Annales*, and when the continuation is received, whatever it may contain, worthy of publication, will be translated and given to our readers.

The smaller weight and less value of the later crops of cocoons, cannot be owing to any deterioration of value in the eggs, nor in the difference of the prevailing temperature—but most probably to the more advanced maturity of the leaves, rendering them less suitable as food.

Since writing the greater part of this article, we have received Kenrick's Silk Grower's Guide, which contains much more full and particular information than we were aware of on this subject, and derived from facts that have occurred in this country. The chapter on "Second and successive crops of Silk," will be given in the next number of the Farmers' Register.

VERD ANTIQUE MARBLE.

A quarry of marble, more brilliant in hue, and susceptible of a higher polish, than any we have observed, has recently been opened in New Haven, about two miles from the public square.

The quarry is so located, as to afford every facility in access to market. The marble is of the purest species of *Verd Antique*, with golden or yellow streaks interwove. We know not whether the "Verd Antique" has been found among any other marbles than those derived from the quarries of Egypt. The specimens that have been shown to us, surpass any that we have seen in the cabinets of science, and museums of our country. Its firmness of texture gives to the artist the advantage of the highest polish; and in beauty and variety of coloring, it cannot be surpassed.—*Am. Historical Magazine.*

HAERLEM RAIL ROAD TUNNEL.

This stupendous undertaking, it is expected, will be completed in about six weeks. The tunnel is already through the mountain 475 feet on the north side, and 60 feet on the south, and about 60 feet more remains to be cut before the workmen meet. This tunnel, when completed, will be the largest, though not the longest, in the world, and cut through rock of as hard and firm a texture as can any where be found. The open cuts on either side of the tannel are almost terrific to gaze at from the edge of the summit. They are through the solid rock, and that on the north side is 55 feet deep. The work is prosecuted under the direction of Mr. Rutter, the able and skilful superintendent, night and day. When completed and connected with the adjoining scenery, it will form one of the grandest and most romantic sights to be found on the face of the globe.—*N. Y. Times.*

BROOMS.

We have been informed, says the Pawtucket Chronicle, that our enterprising friends the Messrs. Summers, last winter, shipped several thousand brooms from New Orleans to Boston and realized a handsome profit by the transaction.

This is reversing the current of trade, and proves that Southerners can compete with Yankees even at their own doors.

Southern broom corn is very superior to the Northern article, being finer and more abundant; as it is free from seeds it offers no attractions to the rats which often make sad havoc with the northern article.—Would it not be an object for some of our northern broom manufacturers to import the southern broom corn, as it can be purchased at a cheaper rate than they can obtain the production of our New England farmers.—*R. I. Journal.*

THE CORN TRADE.

Bread-stuffs have hitherto constituted one of our principal articles of export, amounting in 1831 to within a small fraction of $12,000,000. In 1835, (we speak, in both cases, of the commercial year, ending 30th September,) the quantity was reduced one half, and the value in about the same proportion. In 1831, the value of bread-stuffs *imported* was only $1032, whereas in 1835 it had increased to $311,116. The year ending the 30th of the present month will show still smaller exports of these articles, and larger imports. And the ensuing year, from present appearances, will very possibly show an amount of imports equal to the exports. Should the corn crop be cut off in the northernmost states, as it is now very liable to be, by the early appearance of frost, the extraordinary phenomenon will probably occur, of the greatest grain-growing country in the world becoming dependant upon foreign countries for a portion of its bread!—*N. Y. Journal of Commerce.*

IMFORMATION AND AID WANTED, FOR THE PURPOSE OF PROPAGATING THE BEST NATIVE GRAPES.

A subscriber to the Farmers' Register wishes to obtain, through this journal, information that will aid him and others in selecting and rearing the best existing varieties of native grapes. The object of this gentleman in this, as in other more important labors of his long and highly serviceable life, is not his private benefit, but the public good. We know that he has already done much, though without claiming the merit, in spreading the knowledge, and inducing the propagation of some of the most valuable native grapes. The aid of the readers of the Farmers' Register, if given to this object in the manner desired, will, easily and beneficially to all concerned, increase and quicken, an hundred fold, the results of such efforts, as any one individual, however zealous he might be, could make for this purpose.

All wild grapes are seedlings: and as grapes frequently, (though perhaps not generally,) produce from the seeds fruit quite different from that of the parent vine, it follows that new varieties may be, and are thus continually produced, without the design or the aid of man. Each of our best native kinds, now extensively known and highly prized, has been at first obtained from some single seedling, discovered by accident, and brought to notice by its happening to be observed by some one not so regardless of such things as most persons are. Many single seedling vines now exist, producing fine fruit of peculiar kind, and which are not known except in their neighborhood, and may be lost entirely for want of some person's taking care to perpetuate the kind, by grafts or layers. To bring to light all such vines, it is requested of our readers to aid in bringing together the scattered and almost unknown facts. For this purpose, it is only necessary that any seedling vine, producing fruit of rare and valuable qualities, shall be described minutely and fully, so that it may not be confounded with any different kind—and its locality particularly stated, so that any persons desirous to propagate such varieties, may be sure to obtain cuttings. If such descriptions, (with responsible signatures,) are directed to the Farmers' Register, they will be published for general information and use.

The gentleman who has commenced making a collection of the best native grapes, and at whose suggestion we propose this plan of aiding him and others in such attempts, has already growing, though not yet bearing, vines obtained from various seedlings of which he had heard favorable accounts: and he will furnish his testimony of their value, so soon as their products shall enable him to give a full and correct report.

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